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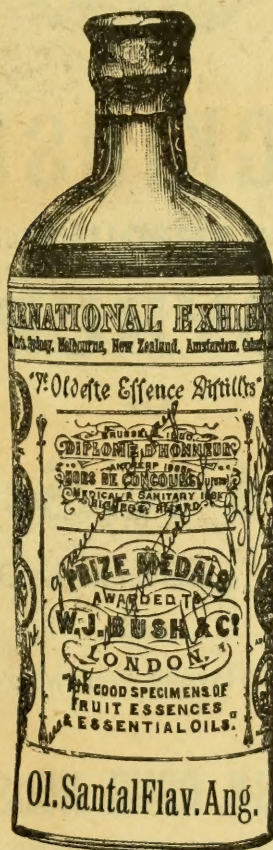
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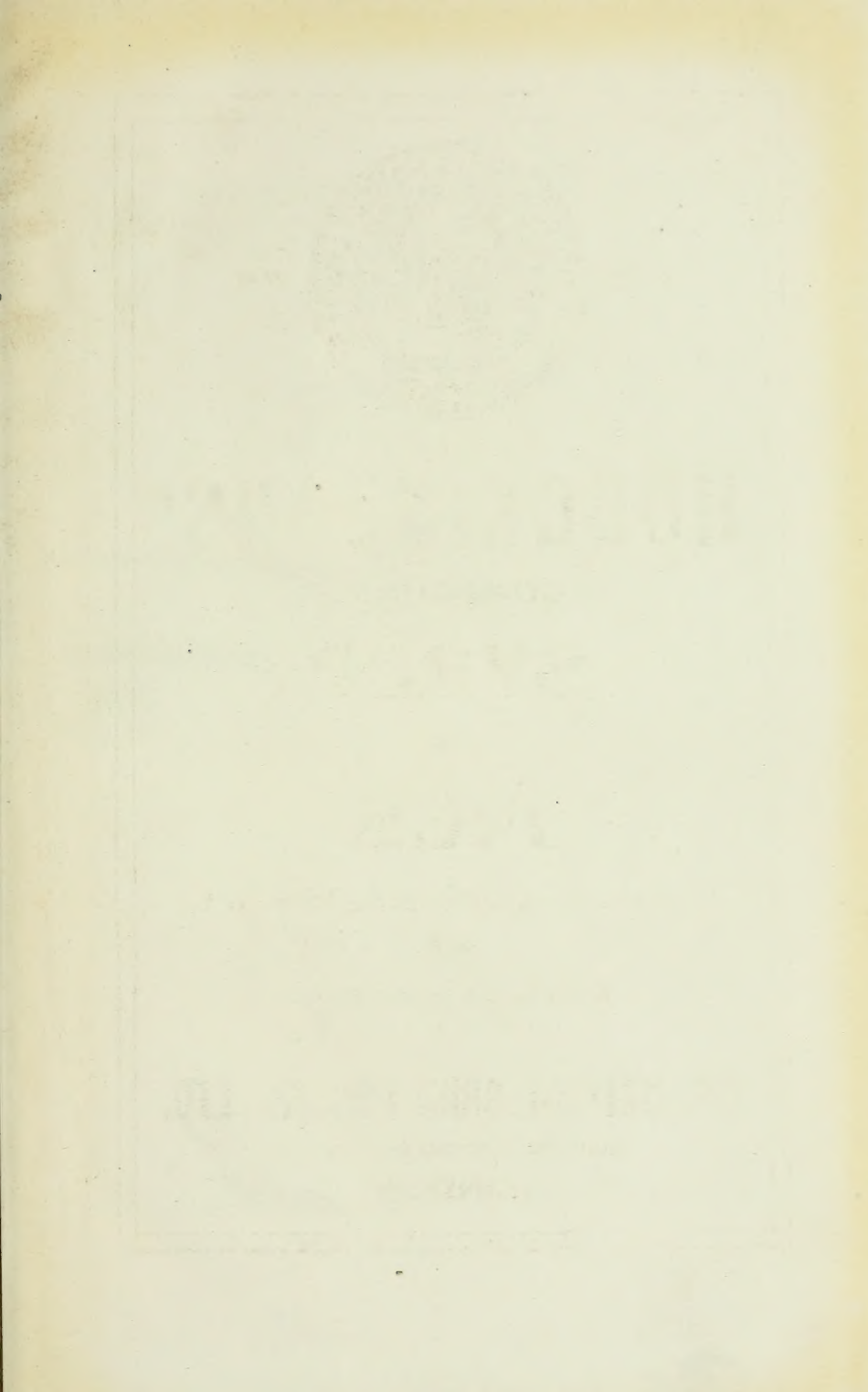
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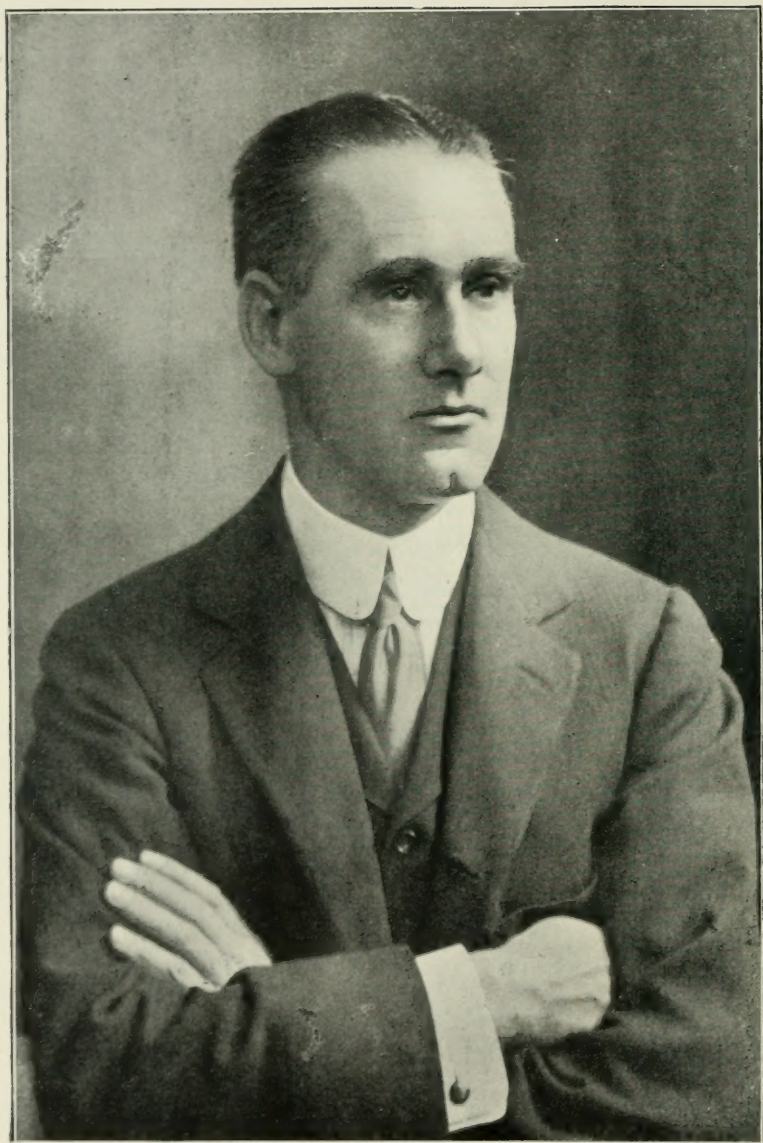
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FROM JULY 1, 1917, TO JUNE 30, 1918,

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL  
CONFERENCE

AT ITS

FIFTY-FIFTH ANNUAL MEETING

HELD IN

LONDON,

JULY 10, 1918.

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1918.

# British Pharmaceutical Conference.

## CONSTITUTION

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following:—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of the Science and Practice of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

## RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.
2. The minimum subscription shall be 7s. 6d. annually, which shall be due in advance upon January 1.
3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.
4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.
5. The Officers of the Conference shall be a President, a number of Vice-presidents not exceeding six, by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one Local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.
6. At each Conference it shall be determined at what place and time to hold that of the next year.
7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.
8. The Executive Committee shall present a report of proceedings annually.
9. These rules shall not be altered except at an annual meeting of the members.
10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

\*. Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.

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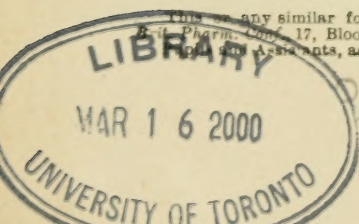
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1893	Nottingham	OCTAVIUS CORDER.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. W. HAYES. R. FITZ HUGH.	C. A. BOLTON
1894	Oxford . .	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S. R. H. DAVIES, F.C.S. W. HAYES. G. T. PRIOR.	H. MATHEWS
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1898	Belfast . .	Dr. C. SYMES.	WALTER HILLS. J. LAIDLAW EWING. J. C. C. PAYNE, J.P. W. F. WELLS.	R. W. MCKNIGHT. W. J. RANKIN.
1899	Plymouth	J. C. C. PAYNE, J.P.	WALTER HILLS, F.C.S. R. J. DOWNES. JOHN MOSS, F.I.C., F.C.S. C. J. PARK.	J. DAVY TURNEY

# BRITISH PHARMACEUTICAL CONFERENCE.

<i>Years.</i>	<i>Places of Meeting.</i>	<i>Presidents.</i>	<i>Vice-Presidents.</i>	<i>Local Secretaries.</i>
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1905	Brighton . .	W. A. H. NAYLOR, F.I.C., F.C.S.	F. RANSOM, F.C.S. R. A. ROBINSON, J.P. D. B. DOTT. J. MONTGOMERY. W. H. GIBSON. F. RANSOM, F.C.S. H. G. GREENISH.	W. W. SAVAGE. C. G. YATES.
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1911	Portsmouth	W. F. WELLS.	H. G. GREENISH, F.I.C. J. F. HARRINGTON. J. P. GILMOUR. H. G. GREENISH, F.I.C. JOHN SMITH. EDMUND WHITE, B.Sc., F.I.C. T. A. WHITE.	T. O. BARLOW. T. POSTLE- THWAIT.



# BRITISH PHARMACEUTICAL CONFERENCE.

<i>Years.</i>	<i>Places of Meeting.</i>	<i>Presidents.</i>	<i>Vice-Presidents.</i>	<i>Local Secretaries.</i>
1912	Edinburgh	SIR EDWARD EVANS, J.P.	C. B. ALLEN. SIR WILLIAM BAXTER. J. LAIDLAW EWING. J. P. GILMOUR. H. G. GREENISH, F.I.C. EDMUND WHITE, B.Sc., F.I.C.	THOS. STEPHENSON.
1913	London	JOHN C. UMNEY, F.C.S.	C. B. ALLEN. SIR WILLIAM BAXTER, J.P. J. P. GILMOUR. H. G. GREENISH, F.I.C. E. SAVILLE PECK, M.A. EDMUND WHITE, B.Sc., F.I.C.	W. J. UGLOW WOOLCOCK
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1915	London.	Major E. SAVILLE PECK, M.A.	J. P. GILMOUR. E. F. HARRISON, B.Sc., F.I.C. F. B. POWER, Ph.D. D. M. WATSON. EDMUND WHITE, B.Sc., F.I.C.	-----
1916	London.	DAVID HOOPER, LL.D., F.I.C.	G. WHITFIELD. MAJOR E. F. HARRISON, B.Sc., F.I.C. D. M. WATSON. EDMUND WHITE, B.Sc., F.I.C.	-----
1917	London.	CHAS. ALEX. HILL, B.Sc., F.I.C.	G. WHITFIELD. W. P. EVANS. H. G. GREENISH, F.I.C. Lt.-Col. E. F. HARRISON, C.M.G., B.Sc., F.I.C. EDMUND WHITE, B.Sc., F.I.C.	-----
1918	London.	CHAS. ALEX. HILL, B.Sc., F.I.C.	G. WHITFIELD. W. P. EVANS. H. G. GREENISH, F.I.C. Lt.-Col. E. F. HARRISON, C.M.G., B.Sc., F.I.C. EDMUND WHITE, B.Sc., F.I.C. G. WHITFIELD.	-----

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# THE BRITISH PHARMACEUTICAL CONFERENCE

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

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# YEAR-BOOK OF PHARMACY

## CHEMISTRY

### ALKALOIDS

**Alkalis, Different, Use of, in Analysis [and specially in the Determination of Caffeine].** — Lucien and — Palet. (*Annales Chem. Analyt.*, 1918, 23, 29.) Attention is directed to the very important influence exercised by the kind of alkaline reagent used in many analytical processes. It is by no means the case, as is assumed, that the results are comparable, irrespective of the alkali employed. This is considered to be one of the causes of observed discrepancies between the results obtained by different analysts.

For instance, the following figures were obtained in the determination of  $\text{NH}_3$  by Schloeseng's method with the materials indicated :—

	Sodium Carbonate.	Potassium Carbonate.	Magnesia.
	p. 100	p. 100	p. 100
Egg Albumin . . . . .	1.02	0.34	0.08
Asparagin . . . . .	—	6.80	0.85
Peptone . . . . .	3.239	1.41	2.159
Urea . . . . .	0.939	3.40	0.255

In the determination of caffeine in maté, by Paul and Cownley's process (*Y.B.*, 1887, 70)  $\text{CaO}$  is the alkali used, which many analysts do not employ since they believe that it energetically retains a part of the alkaloid, with which it forms a definite combination, and that higher results are obtained by the Keller-

Bettmann-Katz process in which AmOH is used to liberate the caffeine. Working on the same sample of maté, the authors have obtained the following percentages of caffeine, with the alkalis indicated: with CaO, 0.79 per cent.; with MgO, 0.78 per cent.; with AmOH, 1.09 per cent. (See also *Y.B.*, 1915, 13,238; 1916, 257; 1917, 10.)

**Alkaloidal Assaying of Drugs, New Method of Extraction.**  
W. M a s k e, junr. (*J. Amer. Pharm. Assoc.*, 1918, 7, 339.)  
Into the stop-cock orifice of a separator there is inserted a wedge-shaped piece of purified cotton, to act as a filter, but at the same time not be too slow in acting as such; a little experience will enable one to know just how tightly to have it fit. Both ends of the piece of cotton are cut off flush with the surface of the stop-cock, and the ends are slightly pushed in with a blunt instrument. The stop-cock is then wiped off with a clean towel so as to remove all cotton fibres, and finally reinserted into the separator. In selecting a separator for this process one in which the stop-cock orifice has a fairly wide bore is selected. No cotton fibre must be left on the plugged stop-cock or the apparatus will leak. Less of drug to be assayed is weighed out than in the U.S.P. method. The amount taken is that of the aliquot part used for shaking out in the U.S.P. monograph. Place this in the prepared separator and add half the amount of solvent directed in the U.S.P. method. The amount of solvent need not be accurately measured. Stopper and shake thoroughly; then add the amount of AmOH directed by the U.S.P. Shake every 5 minutes for one hour. Then pour about 10 c.c. of solvent around the rim of the funnel so as to wash any drug adhering to the sides into the menstruum. Stopper and let stand over night. Then open the stop-cock and stopper and allow the extractive to filter off into another separator. When most of the filtrate has run off and it begins to drop slowly carefully add about 10 c.c. of the menstruum and let this filter off. This process of displacement is continued in 10 c.c. portions until a few drops of the filtrate evaporated to dryness and dissolved in 1 c.c. of N/10 HCl does not give more than faint opalescence with an appropriate alkaloidal precipitant. The combined filtrates are then made acid and the assay continued as in the U.S.P. In addition to overcoming errors, this method uses less drug, and usually less solvent than the U.S.P. method of extraction. It is claimed



that this manipulative modification gives more accurate results than the official U.S.P. processes. It is available for all the official alkaloidal drugs.

**Alkaloids and Similar Compounds, New Colour Reaction for.**  
J. Peset and R. Buendía. (*Anales soc. espan. fis. quim.*, 1916, **14**, 257-63, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2018.) The reagent consists of a saturated solution of titanous acid in strong  $\text{H}_2\text{SO}_4$ . The usual method was employed and the following characteristic colour reactions were obtained with the alkaloids mentioned: aconitine, no colour; artemisine, slow appearance of a moderately intense rose colour; aspidospermine, violet gradually changing to dirty lilac; atropine, no coloration; belladonna, no colour; berberine, yellow, changing to green and black; brucine, caffeine and cantharidin, no colour; cicutine, light brown; cinchonamine, light yellow; cinchonine, cinchonidine and cocaine, no colour; codeine, wine colour, which gradually changes to dark red and is more persistent than that given by morphine; colchicine, yellow, becoming darker and finally changing to a gilt colour; colchicine, same as preceding; cryptopine, intense violet, which may appear almost black; curare, dark red; daturine, no colour; delphinine, raspberry red; digitalin, Malaga wine colour; digitalein, dark yellow, changing to reddish; digitonin, light yellow, changing to orange; digitoxin, brown, changing to greenish and black; duboisine, light yellow, changing to less intense, dirty orange; emetine, violet, changing to reddish and brown; ergotinine, bottle green, changing to blue; eserine, slow appearance of clear yellow, changing to orange (no coloration with  $\text{H}_2\text{SO}_4$  alone; eseridine, same as preceding; spar-teine, no colour; strychnine, faint yellow; strophanthin, yellow, changing to intense green; gelsemine, brown; gelseminine, light yellow (no colour with  $\text{H}_2\text{SO}_4$  alone); hydrastine, mahogany red, changing to Malaga wine; hydrastinine, same as preceding; hyoscyamine and hyoscyne, no colour; heroine, violet, changing to brown; laudanine, intense violet, changing to dark red, this coloration being more intense than that of other opium alkaloids; laudanosine, light violet, changing to dirty lilac; lobeline, brown, changing to dark violet; meconine, yellow, changing to chocolate; morphine, violet changing to dark red; narceine, yellow, changing to chocolate and black; narcotine, wine red, changing to brown; nicotine, light red;

papaverine, violet; pelletierine, effervescence with evolution of aromatic vapours and production of brown colour; picrotoxin, intense yellow, changing to orange; pilocarpine and pilocarpidine, no colour; podophyllotoxin, yellow, rapidly changing to brown; quinidine, light yellow; quinine, same as preceding; sabadine, yellow, changing to brown and magenta; sanguinarine, dark red, rapidly becoming black; solanidine, yellow, quickly changing to red; solanine, yellow; theobromine, no colour; veratrine, yellow, changing to blood red.

**Alkaloids, Metallic Derivatives of.** J. N. Rakshit. (*J. Chem. Soc.*, 1918, **113**, 466.) Compounds of Na and K with codeine, narcotine, cotarnine and of Ca with morphine are described. The Na and K compounds were obtained by heating the metals and bases together under  $C_6H_6$ . Calcium morphinate  $Ca(C_{17}H_{18}O_3N)_2$  was prepared by triturating the alkaloid with  $Ca(OH)_2$  and then treating with EtOH 90 per cent. After contact for 30 minutes and filtration, the solution was exposed over  $H_2SO_4$ , when calcium morphinate separated as a shining sealy powder. It is readily soluble in water, and is not deliquescent.

**Alkaloids, Microchemical Precipitation of with  $ZnCl_2$ -I Solution.** O. Tunnmann. (*Apoth. Zeit.*, 1917, **62**, 76; through *J. Chem. Soc.*, 1917, **112** [II], 345.) The results were obtained with more or less impure alkaloid residues, such as are prepared by the Stas-Otto method. The reagent does not yield crystalline products with arecoline, brucine, cocaine, quinine, cinchonine, conine, colchicine, narceine, nicotine, eserine, or veratrine. On the other hand, it is well adapted for the identification of strychnine, sparteine, morphine, papaverine, cryptopine, and codeine, as well as atropine and hyoscyamine. With atropine, brown or dark red to blackish-red crystals, mostly rhombs, are immediately produced, which, at the commencement of the reaction, vary greatly in size. All the crystals shine but little between crossed Nicols, and do not exhibit pleochroism. The crystal crosses, consisting of four rhombs, are particularly characteristic. The limit of sensitiveness is 10–20  $\mu$ Gm. The iodide crystals of hyoscyamine shine feebly in polarised light; they are very small (4–8  $\mu$ ), almost black, and without pleochroism. The platelets have generally a far less regular circumference than the atropine crystals. Limit of sensitiveness, 10  $\mu$ Gm. Zinc chloride-iodine yields crystals even with very impure

morphine preparations; initially, fine, pale brown needles are formed, which after 10 to 20 minutes unite to sheaves, and are then transformed into prismatic crystals with direct extinction. The latter are brown, the larger ones being nearly black; they do not exhibit pleochroism and scarcely shine between crossed Nicols. Limit of sensitiveness, 5  $\mu$ Gm. Papaverine and cryptopine give long, dull red, yellowish-red, or greenish-red crystals from 2-3  $\mu$  diameter which have direct extinction, show red to blue polarization colours, and exhibit pleochroism. The latter phenomenon yields an excellent method of differentiating between the three opium alkaloids considered here. Limit of sensitiveness, about 10  $\mu$ Gm. In addition to the crystals described above, deep red drops are also formed which, after some hours, pass into deep red aggregates; this points to the presence of a second alkaloid (? cryptopine) in papaverine. Codeine behaves very differently. A powdery precipitate is first obtained, which when warmed deposits larger and smaller particles, from which very slender, generally curved, pale brown crystals grow. The limit of sensitiveness is about 40  $\mu$ Gm. Excess of the reagent is to be avoided. Sparteine is preferably converted into the sulphate, and this gives with the reagent fine, yellowish-red crystal threads, which form sheaves and brushes at their ends. When warmed, coarser prismatic crystals appear after about 30 minutes, and in addition, when further heated, yellow aggregates are occasionally obtained. All the crystals shine strongly in polarized light, have extinction parallel to the long axis, and show very marked pleochroism. When warmed with zinc chloride-iodine, strychnine gives brownish-red or blackish-red spheres or aggregates which attain a diameter of 50  $\mu$ , and lie separately or are grouped in chains. They shine between the crossed Nicols but do not exhibit pleochroism. Limit of sensitiveness, 15  $\mu$ Gm. Unless otherwise indicated the above data refer to crystals formed in 1 to 2 hours after mixing. (See also *Y.B.*, 1917, 2.)

**Alkaloids, Sensitiveness of the  $\text{CHCl}_3$  Shaking out Method for Extraction.** L. LAUNOY. (*Comptes rend.*, 1917, 165, 360-362.) Two hundred c.c. of alkaloidal solution was rendered distinctly alkaline with  $\text{Na}_2\text{CO}_3$  and extracted three times with  $\text{CHCl}_3$  (10 c.c., 10 c.c., and 5 c.c.); the  $\text{CHCl}_3$  extract was evaporated, the residue dissolved in 1 c.c. of dilute  $\text{H}_2\text{SO}_4$  (1:10), and the solution tested for the presence of various



alkaloids. In this way it was found that distinct reactions could be obtained when the original solution contained as little as 1 part of alkaloid in 2,000,000 parts of solution. The alkaloids used in the experiments were aconitine, atropine, brucine, cocaine, colchicine, eserine, pilocarpine, strychnine, veratrine, and conine. (See also *Y.B.*, 1917, 3.)

**Apomorphine, Sensitive Reaction for.** L. P. J. Palet. (*J. Pharm. Chim.*, 1918, 17, 171.) The reagents employed are Guglielmelli's arseno-tungstate, or arseno-tungsto-molybdate, indifferently. The first is prepared as follows: Sodium tungstate, 25 Gm., is dissolved in the cold in water, 200 c.c.;  $\text{As}_2\text{O}_5$ , 20 Gm., is added to the solution. The whole is then boiled for 15 minutes under a reflux condenser, to avoid loss by evaporation. The liquid, which should then have a faint bluish shade, is cooled, filtered, and made up to 250 c.c. The second reagent is prepared by boiling for an hour or two, under a reflux condenser, sodium tungstate 10 Gm.; sodium molybdate, 2 Gm.;  $\text{As}_2\text{O}_5$ , 10 Gm.; water, 75 c.c. After cooling and filtering the volume is made up to 100 c.c. Of the two reagents, the latter is preferred. To one or two drops of the apomorphine solution, which may be in the state of hydrochloride, 1 or 2 c.c. of either of the above reagents is added. The mixture is then well shaken for 1 or 2 minutes, when 5 to 10 c.c. of cold saturated solution of  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  is added. An indigo blue colour is obtained varying in intensity with the amount of apomorphine present, and the time of standing. After 5 minutes, the liquid is again well shaken up, and divided into three portions. One of these is shaken up with  $\text{C}_5\text{H}_{11}\text{OH}$ ; the second with  $\text{C}_6\text{H}_6$ , and the third with acetic ether. The colour in the separated layer of the alcohol of the first portion will be an intense blue; in the second, purple; and in the third, violet. If the coloured acetic ether is decanted from the last and treated with 2 drops of 1:10  $\text{SnCl}_2$  solution, the violet colour is changed to emerald green. The original blue reaction is very intense with dilutions of apomorphine hydrochloride 1:150,000. It is very evident in dilutions of 1:500,000, especially with the immiscible solvent. It is distinctly to be seen with dilutions of 1:100,000 (1:1,000,000?). In all cases the reaction develops on standing. Morphine itself gives a similar blue colour, but this alkaloid does not impart any colour when the reaction mixture is shaken with the immiscible solvents. Narcotine and

narceine give no reaction at all. Other alkaloids give a blue colour, but behave like morphine in not imparting colour to organic solvents, which is characteristic of apomorphine. (See also *Y.B.*, 1915, 8.)

**Atropine, Exact Quantitative Determination of.** H. B. R a s m u s s e n. (*Arch. Pharm. Chem.*, 1917, 24, 83, 110; through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2661.) The method of Javillier for the determination of alkaloids is critically tested, and with minor modification is found very satisfactory. Six Gm. of the extract is dissolved in 5 c.c. of EtOH and 5 c.c. of 20 per cent. AmOH and then shaken out with 60 c.c. of Et<sub>2</sub>O. After 4 hours the Et<sub>2</sub>O is drawn off and 50 c.c. of this extracted with 25 c.c. of 1 per cent. HCl three times. To the combined HCl extracts is added an excess of 10 per cent. silicotungstic acid and this is allowed to stand 8 hours, filtered, washed with 1 per cent. HCl, dried and ignited. One Gm. of the ash from this precipitate (SiO<sub>2</sub>.12WO<sub>3</sub>) corresponds to 0.4080–0.4089 Gm. atropine as against the calculated factor of 0.4067. An allowance must be made for the solution of atropine in the solutions used. This is 0.0054 Gm. for every 100 c.c. of the HCl solution at 18° C. The agreement between the weighing of the SiO<sub>2</sub>.12WO<sub>3</sub> and the N determinations is very good, the former giving consistently a trifle higher results. (See also *Y.B.*, 1917, 5.)

**Cinchonine and its Isomerides, Action of HBr on.** E. L é g e r. (*Compt. rend.*, 1918, 166, 76–79.) When cinchonine or its isomerides are heated on a water-bath with HBr sp.g. 1.49, there is addition of HBr, but at the same time isomerisation occurs. Thus, in the case of cinchonine, the mother liquors, after the separation of hydrobromocinchonine, contain cinchonigine δ-cinchonine, apocinchonine, cinchoniline in small amount, and an amorphous base, which is named cinchoniretine, and is isomeric with cinchonine. From cinchonigine and apocinchonine no cinchoniline was obtained. Although the four isomeric bases give the same hydrobromocinchonine, with cinchonigine and apocinchonine there is a simultaneous formation of hydrobromoapocinchonine.

**Codeine, Influence of, in Preventing the Precipitation of Morphine in the B.P. Method of Opium Assay.** H. E. A n n e t t and H. S i n g h. (*Analyst*, 1918, 43, 205.) It is found that codeine when present in quantity, as is the case in Indian opiums, has sufficient influence in hindering the precipitation of mor-

phine in the  $\text{Ca}(\text{OH})_2$  and  $\text{AmOH}$  process to render the official B.P. method for the morphinometric assay of opium incorrect. The results are, at least in the case of Indian opiums, invariably too low. It is shown by experiment that codeine prevents the complete precipitation of morphine under the conditions of the method. It is suggested that the B.P. method might be modified by extracting the  $\text{Ca}(\text{OH})_2$  morphine solution with toluene, to remove the codeine, before precipitating the morphine.

**Cryptopine and its Salts.** H. E. Watt. (*Pharm. J.*, 1918, [4], 46, 147.) Cryptopine was first observed in the chemical works of Messrs. T. and H. Smith by the manager, James Smiles, in 1867. Some crude opium mother liquors had been put away for a time in a cellar. Smiles observed in these liquors crystals which on investigation proved to be a new alkaloid. It was from the fact that this observation was made in a cellar that the name cryptopine was given to the new alkaloid (from *crypta* a vault). The alkaloid is much more abundant in Indian and Persian opium than in Turkey opium. Smith obtained only 5 ounces from 4 or 5 tons of opium, equal to about 0.003 per cent., but it is probably present in larger quantity. Pictet says 0.08 per cent., but does not mention the kind of opium. In the author's opinion, in Indian opium it is present to the extent of not less than 0.3 per cent. It is decidedly embarrassing to the morphine manufacturer from its peculiar property of giving a deep blue colour with sulphuric acid, while pure morphine should give no colour. Specimens of cryptopine hydrochloride, cryptopine nitrate, and cryptopine sulphate were exhibited to illustrate the unique property of these alkaloidal salts of forming a firm jelly in dilute aqueous solution. The hydrochloride jelly contains 3 per cent. of the salt dissolved in warm water, which on cooling sets to a firm transparent jelly resembling ordinary gelatin. In these, small clusters of crystals were just beginning to form at a few points in the jelly. A similar solution of the nitrate sets to a translucent jelly, and a similar solution of the sulphate sets to a white opaque jelly, resembling curds. The salts are seemingly highly soluble in hot water and comparatively sparingly soluble in cold water.

**Datura alba, Distribution of Alkaloids in.** H. C. Brill. (*Philipp. J. Sci.*, 1917, 11, 257.) In the Philippines the sun-dried mature seeds of *Datura alba* were found to be richer in total alkaloids than other parts of the plant; they yielded 0.561



per cent. The other organs are placed in the following order, according to their alkaloidal strength : Flowers, stems, immature fruit, and leaves. Prolonged drying and heating at high temperatures cause a loss of the alkaloid ; the alkaloid is more readily extracted from the material by EtOH in an acid suspension than in either neutral or alkaline. A possible commercial method for obtaining the alkaloids is to grind the raw material finely, treat it with hot acid water, and then treat this extract with fuller's earth. By extracting this earth with EtOH after it has been made alkaline, a concentrated solution of the alkaloids in EtOH can be made. The alkaloids are somewhat soluble in neutral water. (See also *Gen. Index.*)

**Delphinium glaucum and D. glaucescens, Alkaloids of.** S. K. Lo y. (*Ann. Rept. Wyoming Agr. Expt. Sta.*, 1916, 26, 82-3 ; through *Chem. Abst. Amer. Chem. Soc.*, 1917, 11, 2099.) Immature *Delphinium glaucum* contains a water-soluble crystalline complex alkaloid which is very poisonous. Upon hydrolysis a second alkaloid is split off which is much less toxic. It is crystalline and melts sharply at 101°C. At the time of flowering the main alkaloid becomes amorphous and becomes less soluble in water and about seven times less toxic. However it contains a second alkaloid (amorphous)\* which is highly poisonous, subcutaneous injection into the ear of a rabbit producing death in less than 30 seconds. This derived alkaloid may be obtained by allowing the original to come in contact with water or by the addition of a mild alkali. A third alkaloid, also amorphous, has been isolated from the original water-soluble form. In ordinary doses it is scarcely toxic. Upon going to seed *D. glaucum* does not lose its alkaloids, but they become highly resistive to being broken up into poisonous constituents. *D. glaucescens* is quite different chemically from the *D. glaucum*. The alkaloids are crystalline throughout the entire growth of the plant, and are about half as toxic as those of the other species. (See also *Y.B.*, 1911, 13 ; 1913, 19 ; 1914, 145 ; 1917, 198 ; and *Gen. Index.*)

**Epinephrine in Anæsthetic Hypodermic Tablets, Estimations of Minute Quantities of.** T. Sollmann. (*J. Amer. Pharm. Assoc.*, 1918, 7, 435.) The chemical assay of such tablets is apt to be unsatisfactory, partly because of the small quantities involved, but mainly because the colour-reactions of epinephrine are not always reliable in the presence of other

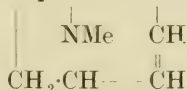
substances. A biological assay is much more rapid, and possesses very fair accuracy. The most suitable quantitative method for this purpose consists in the intracutaneous injection of a dilute solution into the skin of the human forearm. The quantity of epinephrine is judged by the extent, intensity and duration of the blanching, as compared with the effects of a known solution, injected at the same time. If the solution contains an anæsthetic, the quantity of epinephrine may also be judged by the duration of the anæsthesia. This is a useful check on the blanching. The solution should be very dilute. A dilution of epinephrine of 1 : 800,000 is recommended. This is easily distinguishable from a dilution of 1 : 1,600,000. The strength may be modified to meet the idiosyncrasy of the subject. The dilutions should be made with a boiled 1 per cent. solution of NaCl. The method of injection is simple. One or 2 c.c. are drawn into a Luer syringe, having a very fine needle. The skin of the inner surface of the forearm is cleansed with a pledget of cotton moistened with EtOH. The point of the needle is thrust into, not under, the skin, holding the needle at a very slight angle. Enough of the solution (about 0.2 to 0.4 c.c.) is injected to raise a wheal of about 7 mm. diameter—the exact quantity or size of the wheals is not very important, if all are made nearly alike. Three injections are made of each solution, across the arm. The next solution is then injected in the same manner, about an inch distant. The sensation is tested with a bit of cotton, twisted to a point. A sketch is made of the area of blanching. The observations are repeated at intervals first of 5 minutes, later of 10, 20 and 30 minutes, until a fair comparison is secured. It is advisable to make one of the known solutions of the same as the reputed strength as the sample to be tested, and another of one-half this strength. The injections are practically painless, but the skin may remain slightly swollen and hardened for some days. (See also *Y.B.*, 1917, 19.)

**Geneserine, Constitution of. Transformation of Eserine into Geneserine.** M. Polonovski. (*Bull. Soc. Chim.*, 1917, 21, 191; through *J. Soc. Chem. Ind.*, 1917, 36, 1193.) Geneserine is regarded as the amine-oxide derivative of eserine produced by the attachment of an oxygen atom at the animo-group of the latter substance: the behaviour of geneserine with  $\text{SO}_2$  and its oxidizing action towards HI and methyl iodide, are in

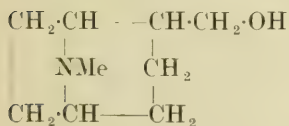
accord with the properties of the amine-oxides, and the liberation of Ag from neutral  $\text{AgNO}_3$  may be regarded as a process of "mutual reduction" analogous to the reaction of  $\text{H}_2\text{O}_2$  with  $\text{HMnO}_4$ . This view of the constitution of geneserine was confirmed by oxidation experiments,  $\text{KMnO}_4$  or dilute  $\text{HNO}_3$  giving rise to methylamine as the only isolated product from eseroline, whereas in aqueous-alcoholic solution  $\text{H}_2\text{O}_2$  actually effected the conversion of eserine into geneserine. Similarly eserethol in acetone solution was oxidized by  $\text{H}_2\text{O}_2$  with formation of geneserethol, but the conversion of eseroline into geneseroline could not be effected. The difference between the constitution of eserine and geneserine is therefore to be represented by the two formulae  $\text{CH}_3\cdot\text{N}:\text{C}_{12}\text{H}_{14}\text{N}\cdot\text{O}\cdot\text{CO}\cdot\text{NH}\cdot\text{CH}_3$  and  $\text{O}:\text{N}(\text{CH}_3):\text{C}_{12}\text{H}_{14}\text{N}\cdot\text{O}\cdot\text{CO}\cdot\text{NH}\cdot\text{CH}_3$ . (See also *Y.B.*, 1916, 23.)

**Heroin forbidden in U.S.A. Public Service.** (*Med. Press*, 1917, 155, 136.) The officials of the U.S. Public Health Service are directed to cease prescribing heroin for any purpose. It is proposed by the U.S. Prison Reform Association to introduce a bill into Congress to make the sale or manufacture of acetomorphine hydrochloride a criminal offence. Deaths are said to have resulted from a dose of  $\frac{1}{6}$  grain, and alarming symptoms to have followed the administration of  $\frac{3}{10}$  grain more frequently than has been generally thought possible.

**Homotropine and Ecceaine, New Physiologically Active Substances from Cocaine.** J. von Braun and E. Mueller. (*Berichte*, 1918, 51, 235; through *J. Chem. Soc.*, 1918, 114 [1], 233.) Cocaine is converted into ecgonidine (anhydroecgonine, and this into its ethyl ester,  $\text{CH}_2\cdot\text{CH}-\text{CH}\cdot\text{CO}_2\text{Et}$



This is reduced by means of H and Pd to ethylhydroecgonidine. This is again reduced by means of Na and EtOH, when the new base, homotropine (annexed formula), crystallizes in needles, m.p.  $85^\circ$ ,  $[\alpha]_D^{20} + 22.48^\circ$  (in EtOH), and forms a hydrochloride, m.p.  $192^\circ$ , an aurichloride, m.p.  $191^\circ$ , a picrate, thin needles, m.p.  $208-209^\circ$ , and a methiodide, which may be converted into a platinichloride,





m.p. 183°, and an aurichloride, yellow leaflets, m.p. 238°. The benzoate is produced by means of benzoyl chloride: it is a viscous oil, which forms a platinichloride, m.p. 201°, an aurichloride, m.p. 161°, and a lemon-yellow picrate, m.p. 177°. The trobate and mandelate are also described.

The pharmacologically inactive homotropine can be rendered physiologically active by esterification with organic acids such as benzoic, tropic, or mandelic acid, the resulting esters resembling atropine in their effect on the animal organism. In this way, anhydroecgonine, hitherto valueless, can be converted into therapeutically useful products (D.R.P. 299806, *Chem. Zentr.*, 1917, ii, 510; through *J. Chem. Soc.*, 1918, 114, 235).

In addition to this the preparation of norecgonidine from cocaine and from homotropine is described. The ethyl ester of norecgonidine by the action of  $\gamma$ -bromoprophyl benzoate gives another new base designated *eccaine*, and is an oil which forms a hydrochloride, m.p. 117°, a picrate, m.p. 139–141°, and a methiodide, m.p. 194–195°. It is more active as an anæsthetic than cocaine, is non-toxic, and so stable that its solutions may be sterilized easily.

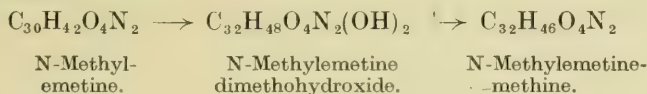
[The name "homotropine" is phonetically so nearly similar to that of the chemically allied, but distinct homatropine, that its selection appears to be likely to lead to confusion.—Ed. *Y.B.*]

**Hyoscyamus muticus, Indian, of good Alkaloidal Value.** (*Bull. Imp. Inst.*, 1917, 15, 325.) *H. muticus*, from India, when first examined was found to have a very low alkaloidal content, only 0.1 per cent. The same plant from the Sudan gave upwards of 0.7 per cent. This Sudanese hyoscyamus is at present the chief commercial source of atropine. Barnes has reported that a sample of Indian hyoscyamus, probably *H. muticus*, yielded 0.827 per cent. of total alkaloids. A fresh consignment of *H. muticus*, grown in Madras, has lately been received and examined at the Imperial Institute. This has been found to yield 0.66 per cent. of total alkaloid. It is desirable, therefore, that the experimental cultivation of this henbane in India should be continued. (See also *Y.B.*, 1915, 16: 1916, 27.)

**Ipecacuanha Alkaloids.** F. L. Pym an. (*J. Chem. Soc.*, 1917, 111, 419.) In extension of the earlier work, two new alkaloids of ipecacuanha have been examined and N-methyl emetine investigated more fully. The non-phenolic, Et<sub>2</sub>O-

soluble alkaloids are converted into the hydrobromides and the aqueous mother liquor left after crystallizing the emetine salt is so treated that the hydrogen oxalates of the minor bases are isolated. The mixture is basified and the alkaloids separated by fractional extraction with acids from the  $\text{CHCl}_3$  solution. The more basic alkaloid, amounting to 0.015 to 0.033 per cent. of ipecacuanha, is shown to be the O-methyl ether of psychotrine. This yields emetine and isoemetine on reduction (and another base, designated "C"), just as psychotrine yields cephaeline and isocephaeline. Conversely, when emetine is oxidized with two atomic proportions of I, it yields methylpsychotrine, and both these further give rubremetine on oxidation with more iodine or bromine. Methylpsychotrine forms an N-benzoyl derivative, and therefore these bases are secondary.

The less basic alkaloid amounts to about 0.002-0.006 per cent. of ipecacuanha. It is designated emetamine and probably contains a  $-\text{C}:\text{C}-$  and a  $-\text{C}:\text{N}-$  linking. N-Methylemetine salts are described, and its degradation to a methine, according to the scheme:



(See also *Y.B.*, 1917, 8, 9.)

**Ipecacuanha Alkaloids.** F. L. P y m a n. (*J. Chem. Soc.*, 1918, 113, 222.) It has been shown previously that O-methylpsychotrine gives a mixture containing emetine and isoemetine<sup>1</sup> on reduction. The formation of isoemetine was demonstrated by the isolation of its benzoyl derivative, for neither isoemetine nor any of its salts had at that time been obtained in a crystalline form. Later, however, the hydrobromide became crystalline, and was readily purified by crystallization from water, and, from the pure salt, the base, hydrochloride, and hydrogen oxalate were prepared in crystalline form. On benzoylation, the base gave the benzoylisoemetine previously described.

<sup>1</sup> The term isoemetine is clearly appropriate to this compound, which is the methyl ether of the isocephaeline described in 1914 (*Y.B.*, 1914, 9), and the parent of the substance already named benzoyl-isoemetine. It has since been employed by Karrer (*Y.B.*, 1917, 8) for a reduction product of rubremetine. Whilst the coincidence is unfortunate, it does not appear to be important, for Karrer's "isoemetine"—an amorphous base from which no crystalline derivatives were prepared—is probably a mixture of stereoisomerides.

Since emetine and isoemetine are produced by the reduction of methylpsychotrine, it was to be expected that isoemetine, like emetine, could be oxidized to methylpsychotrine and rubremetine, and this proved to be the case. The view that emetine and isoemetine are stereoisomerides was thus confirmed, and it appeared to be of interest to determine whether an equilibrium between the two bases could be established by boiling with amyl alcohol and sodium amyloxide. Experiments to this end were unsuccessful, for, after fourteen hours' boiling, no evidence of partial racemization was obtained, each base being recovered unchanged except in so far as it had been hydrolysed to phenolic bases. The fact that psychotrine gives cephaeline and isocephaline on reduction, whilst the methyl ether of psychotrine gives emetine and isoemetine, indicated the probability that isoemetine was the methyl ether of isocephaline, and this has now been proved by preparing isoemetine by the methylation of isocephaline.

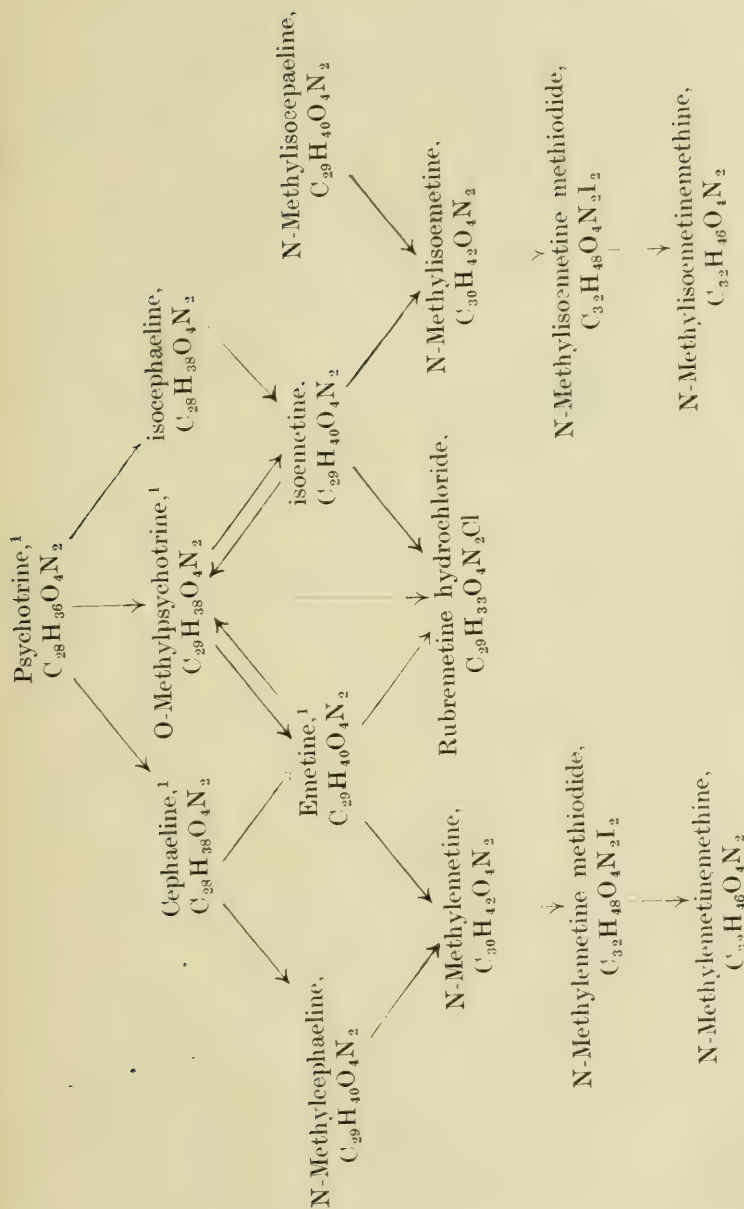
When methylated under suitable conditions, isoemetine gives a well-crystallized N-methyl derivative, N-methylisoemetine, which proves to be the O-methyl ether of the isomeride of N-methylcephaline previously described; this substance is therefore N-methylisocephaline.

Complete methylation of isoemetine yields a well-crystallized N-methylisoemetine methiodide, which is accompanied by an amorphous salt. This is probably a mixture of the two stereoisomeric methiodides of N-methylisoemetine, the isomerism of which depends on the presence of an asymmetric nitrogen atom, for it is shown later that the complete methylation of emetine leads to a similar result. This view is borne out by the fact that the crystalline and amorphous salts give N-methylisoemetinemethine in equally good yield when converted into the corresponding methohydroxides and evaporated in a vacuum. This methine, like that of emetine, crystallizes well as the neutral oxalate, and also forms a well-crystallized methiodide. So far, attempts to effect its further degradation have not led to crystalline products.

The connexion between the compounds described above and their relation to the compounds previously described is shown in the diagram on p. 15.

H. H. Dale has found isoemetine to be rather less than half as toxic as emetine. With both emetine and isoemetine death results from acute heart failure. Isoemetine is practically





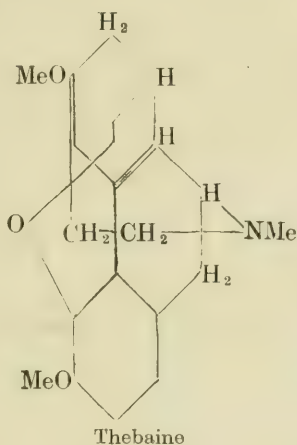
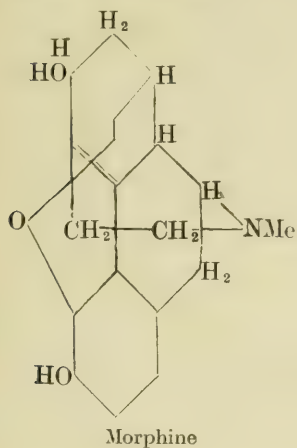
non-emetic for cats. Clinical trials made by G. C. Low show that isoemetine is well tolerated in relatively large doses, but it does not appear to have any appreciable effect on the amoebae of dysentery. Emetine nauseates the patient, but causes elimination of the amoebae. (See also *Y.B.*, 1914, 9; 1917, 8, 9, 200.)

**Morphine, Colorimetric Methods for the Estimation of very small Quantities of.** A. Heiduschka and M. Faul. (*Arch. Pharm.*, 1917, 255, 172-191, through *J. Chem. Soc.*, 1917, 112 [11], 554.) [1] Modified Georges and Gascard's method. Instead of using a Duboseq colorimeter, the authors prepare a scale of colours by diluting a faintly acid solution of morphine in about N/10-HCl to a concentration of 1 in 1,000 and then preparing from this a series of solutions of concentrations down to 1 in 10,000. Equal volumes (10 c.c.) of these solutions are treated with 5 c.c. of 5 per cent.  $\text{HIO}_3$  solution, and the yellow colorations are examined after about half a minute. The differences in colour are more pronounced in the more dilute solutions. Whilst morphine can be thus detected at a concentration of 1 in 12,500 quantitative observations can only be made at concentrations between 1 in 1,500 and 1 in 5,500. The method is rendered more sensitive if 1 c.c. of 10 per cent. AmOH is added about 5 minutes after the addition of the iodic acid. Morphine can thus be detected at a concentration of 1 in 18,500 and estimated at concentrations between 1 in 5,000 and 1 in 16,500.

II. *Estimation with Marquis's Reagent.*— One c.c. of the morphine solutions prepared as above, is evaporated in a small basin, the residue is treated with 1 c.c. of Marquis's reagent (2-3 drops of 40 per cent. formaldehyde solution, 3 c.c. of strong  $\text{H}_2\text{SO}_4$ ), and the violet solution is washed into the comparison tube with 4 c.c. of  $\text{H}_2\text{SO}_4$ . The colours are examined by transmitted light, since in reflected light an actual colour change from blue to bluish-brown renders the comparison untrustworthy. Morphine can thus be estimated at concentrations between 1 in 1,400 and 1 in 14,000, and, the dilution with the  $\text{H}_2\text{SO}_4$  being omitted, can be detected at a concentration of 1 in 25,000. Two samples of ripe poppy capsules examined by these methods were found to contain 0.017 and 0.068 per cent. of morphine respectively; in both cases the seeds did not contain morphine.

**Morphine, Constitution of.** F. Faltis. (*Archiv. Pharm.*, 1917, 255, 85, through *J. Chem. Soc.*, 1917, 112, [1], 411.) Review-

ing the work of Knorr, Freund, von Braun and others, it is shown that the results of all may be explained in the following graphic formulae for morphine and thebaine.



In these the oxide ring differs from that in Knorr's formula, and is under considerable tension.

**Morphine, Methyl Derivatives of.** C. Mannich. (*Arch. Pharm.*, 1916, **254**, 349, through *J. Chem. Soc.*, 1917, **112**, i., 473.) According to the constitution of morphine proposed by Knorr and Pschorr, the alkaloid functions as a tertiary base, as a phenol, and as a secondary alcohol. Theoretically, therefore, one trimethyl, three dimethyl, and three monomethyl derivatives should be capable of existence. Four of these are already known, and the remaining three are now described. Methylcodeine methochloride,  $C_{20}H_{26}O_3NCl$ , colourless crystals, m.p.  $208^\circ C$ ., loses methyl chloride by heating under 2 mm. pressure and yields morphine OO-dimethyl ether,  $C_{17}H_{17}ON(OC_2H_5)_2$ , prismatic or tabular crystals, m.p.  $140^\circ$ – $141^\circ C$ . This method of demethylating quaternary bases is not applicable to any other morphine derivative. A second method of preparing the same dimethyl ether is the following. Morphine oxide or codeine oxide is shaken with a large excess of  $N/NaOH$  and methyl sulphate at  $0^\circ C$ ., the solution is faintly acidified with  $HCl$  and treated with aqueous solution of  $KI$ , and the crystalline substance obtained, m.p. about  $253^\circ C$ . (doubtless the hydriodide of morphine oxide dimethyl ether),



is heated at about  $80^{\circ}\text{C}$ . with  $\text{SO}_2$  and a little  $\text{NaHSO}_3$ , and the solution is made alkaline and extracted with ether, whereby morphine OO-dimethyl ether, identical with that mentioned above, is obtained. Morphine methoxymethyl ether,  $\text{C}_{17}\text{H}_{17}\text{ON}(\text{OH})(\text{O}\cdot\text{CH}_2\cdot\text{OCH}_3)$ , colourless needles, m.p.  $94\text{--}96^{\circ}\text{C}$ ., obtained by treating a suspension of the sodium derivative of morphine in cold  $\text{CHCl}_3$  with chloromethyl ether, is insoluble in alkali hydroxides, does not give a coloration with  $\text{FeCl}_3$ , but instantly develops a violet coloration (the morphine-formaldehyde reaction) with strong  $\text{H}_2\text{SO}_4$ . It is stable towards alkalis, but is converted by dilute acids into morphine, formaldehyde, and methyl alcohol. Heterocodeine (the monomethyl ether of morphine methylated at the secondary alcoholic group) is obtained by the following method. Morphine methoxymethyl ether is gently warmed with  $\text{H}_2\text{O}_2$ , and the resulting syrup, which doubtless contains an amino-oxide, is treated with  $\text{N}/\text{NaOH}$  and methyl sulphate at  $0^{\circ}\text{C}$ ., and the resulting solution is acidified with dilute  $\text{H}_2\text{SO}_4$  and treated with strong  $\text{KI}$  solution: the precipitate is collected and warmed with  $\text{SO}_2$  for 2 days, whereby heterocodeine,  $\text{HO}\cdot\text{C}_{17}\text{H}_{17}\text{ON}(\text{OCH}_3)$ , crystals, m.p.  $242^{\circ}\text{C}$ ., is obtained, which is isolated as the hydrochloride, prisms containing  $2\text{H}_2\text{O}$ , m.p.  $102^{\circ}\text{C}$ . Heterocodeine is soluble in alkali hydroxides, develops a blue coloration with  $\text{FeCl}_3$  and a reddish-violet coloration with formaldehyde and  $\text{H}_2\text{SO}_4$ , and is shown to be a true derivative of morphine, not of iso- or  $\psi$ -codeine, by its conversion by diazomethane into morphine OO-dimethyl ether.

**Morphine, Titration and Estimation of, with Iodic Acid.** J. N. Rakshitt. (*J. Soc. Chem. Ind.*, 1917, 36, 989.) If a solution of morphine be treated with an excess of  $\text{HIO}_3$  in the presence of dilute  $\text{H}_2\text{SO}_4$ , the oxidation of morphine is quantitative, two molecules of morphine absorbing three atoms of oxygen,  $2\text{C}_{17}\text{H}_{19}\text{NO}_3 + 3\text{O} = (\text{C}_{17}\text{H}_{19}\text{NO}_3)_2\text{O}_3$ . But the reduction of  $\text{HIO}_3$  in the presence of an excess of morphine is incomplete, the degree of reduction depending much on dilution, temperature, and time. The solution of  $\text{HIO}_3$  suitable for this purpose is prepared by dissolving 5.86 Gm. in 1000 c.c. of water (equivalent to  $\text{N } 5$  hypo.: it keeps well for a few months. When about 1 per cent. solution of morphine, is treated with an excess of  $\text{HIO}_3$  solution, the colour of the mixture changes to brown, but the starch solution does not generally become blue. Experi-

ments in which the starch solution is blue show little difference in titration from those in which there is no action on starch. The starch, however, always becomes intensely blue with the addition of the first drop of thiosulphate solution. The introduction of starch solution before the alkaloid is important, because if free I is liberated it reacts with the alkaloid, forming an iodo-compound which often vitiates the results.

It has been found that the oxidation of morphine is not complete in less than 10 minutes. It has been found that 15 minutes is quite sufficient to complete the reaction. In the estimation of morphine by this process it is convenient to use about 0.05 to 0.15 Gm. of morphine (either in the form of free base, hydrochloride, or sulphate), 50 c.c. of water, 5 c.c. of 10-N  $\text{H}_2\text{SO}_4$ , and 10 c.c. of 1 per cent. freshly prepared cooled starch solution, and shake well; 5 to 15 c.c. of N/5  $\text{HIO}_3$  solution is then introduced, the mixture shaken again thoroughly, set aside in a dark place for about 15 minutes, and titrated back with N/10 Hypo. The number of c.c. of iodic acid consumed multiplied by 0.0190 gives the amount of morphine present in the quantity of sample taken.

The method is not applicable to the determination of morphine on opium, since codeine and narcotine absorb a certain amount of oxygen under these conditions.

**Nicotine on Sprayed Plants, Test for Presence of.** V. I. Safró. (*J. Econ. Entomol.*, 1917, 10, 459-61, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 79.) It is generally believed that as soon as a nicotine spray has dried on a plant, the nicotine disappears, and that any toxic effects the spray may have on insects must be imparted very soon after application. Tests demonstrate that nicotine may be present a considerable time after the apparent disappearance of the spray. The following qualitative test for nicotine on foliage is given: A number of leaves (bark, twigs, or fruit may also be used) are thoroughly rinsed, without breaking the epidermis, in a small amount of distilled water. The rinse water is filtered, acidified slightly with  $\text{HCl}$ , and filtered again if a precipitate forms. Several drops of 1 per cent. silicotungstic acid are now added. A white cloudiness indicates the presence of nicotine. It is important to make control tests with unsprayed leaves from the same species of plant as organic material from ruptures in the leaves may give a similar reaction. The test has not been found

successful with nicotine-lime-sulphur spray as the colloidal S present interferes, but it is satisfactory with all other nicotine combinations.

**Novocaine, Identification of.** A. Sanchez. (*Revista farm.*, 1917, 699; *Union Pharm.*, 1918, **59**, 123.) (1) Two c.c. of a 1 : 500 solution of novocaine is treated with 2 drops of 1 : 10  $\text{NaNO}_2$  solution and 3 drops of  $\text{H}_2\text{SO}_4$ . After agitating and heating to drive off  $\text{NO}$ , 5 drops of Millon's reagent is added. A pink colour, persistent on boiling, is obtained. (2) To 2 c.c. of the same solution of novocaine 10 drops of  $\text{H}_2\text{SO}_4$  is added with 5 Cgm. of  $\text{MnO}_2$ . On boiling and conducting the vapours given off into 1 c.c. of Schiff's reagent, contained in a small test tube, a violet colour is obtained. (3) Novocaine gives a yellow precipitate with Br solution, soluble on warming. The reaction, obtained with a solution of the base of known strength, may be used for the approximate determination of novocaine. Thus, a 1 : 500 solution of pure novocaine is run into 10 c.c. of 8 : 1000 Br solution to complete decoloration. The amount thus required to discharge the colour being known, the quantity of novocaine in a solution of unknown strength may be roughly approximated with the same Br solution. (See also *Y.B.* 1910, 145; 1917, 138.)

**Opium, Improved Lime Method for Morphinometric Assay of.** W. Maske, jun. (*J. Amer. Pharm. Assoc.*, 1918, **7**, 248.) Weigh out 7.5 Gm. of opium and dry at  $60^\circ\text{C}$ . Transfer the dried opium to a mortar containing 5 Gm. of fine, clean quartz sand and 3 Gm. of slaked lime. Triturate the three ingredients thoroughly until a finely divided homogeneous mixture of opium is obtained. Brush the contents of the mortar on a piece of glazed paper and from there into a glass-stoppered Erlenmeyer flask of about 150 c.c. capacity. Add 75 c.c. of distilled water and shake vigorously for 15 minutes, and then every 10 minutes during 3 hours (or continuously in a mechanical shaker). Filter off 50 c.c. of the solution into a 50 c.c. volumetric flask. This represents approximately 5 Gm. of opium.

Transfer the whole of the filtrate to a separator, washing the flask with a small portion of distilled water. Add 15 c.c. of  $\text{Et}_2\text{O}$  and shake thoroughly. Now add 1 Gm. of  $\text{AmCl}$  and shake frequently for half an hour; then set it aside in a cool place over night. Plug the stem of the separator fairly tight with a pledget of purified cotton and allow the liquid to drain off.



Wash the funnel and its contents with morphinated water until the drippings are colourless, then wash with two small portions of distilled water to displace the morphinated water. Dislodge the cotton plug in the separator stem by blowing vigorously into the top of the separatory funnel and catch it in a clean Erlenmeyer flask.

Close the stop-cock and add 25 c.c. of  $N/10$   $H_2SO_4$ , replace the stopper and agitate until the crystals in the separator are dissolved. Then dissolve the crystals in the stem of the separator by holding the funnel at an angle, allowing the acid to run out slowly into the Erlenmeyer flask and at the same time rotating the separator. Wash the separator with three 10 c.c. portions of distilled water; also wash the stem of the separator, adding all of these washings to the contents of the Erlenmeyer flask. Agitate the flask until any remaining crystals are dissolved and titrate the excess of acid with  $N/50$   $KOH$ . Make a correction by adding to the actual number of c.c. of acid consumed one twenty-fifth of this amount. Each c.c. of  $N/10$   $H_2SO_4$  consumed corresponds to 0.028516 Gm. of anhydrous morphine. (See also *Y.B.*, 1917, 13.)

**Pomegranate Alkaloids, Preparation of Mydriatic Bases from.** L. E. Werner. (*J. Amer. Chem. Soc.*, 1918, **40**, 669.) The preparation of methylgranatoline-tropate hydrobromide and methylgranatoline-mandelate hydrobromide, which are strongly mydriatic, is described as well as that of other analogues of atropine and homatropine, derived from methyl granatoline, obtained from pseudo pelletierine.

**Solanine.** A. Heiduschka and H. Sieger. (*Arch. Pharm.*, 1917, **255**, 18, through *J. Chem. Soc.*, 1917, **112**, [1], 407.) On account of the tendency of solanine to decomposition and to sublimation, its m.p. is rather indefinite; a more valuable characteristic is the optical activity in 2 per cent.  $HCl$   $[\alpha]_D^{20} - 42.16^\circ$ . The composition of the pure substance obtained in the present investigation was different from that given by earlier workers, and agreed best with a formula  $C_{52}H_{91}O_{18}N$ . Contrary to previous statements, the hydrochloride ( $C_{52}H_{91}O_{18}N$ ,  $HCl$ ) was obtainable in a crystalline condition, m.p.  $212^\circ C$ . (decomp.), after sintering at  $117^\circ C$ ., but no oxalate could be isolated. Hydrolysis of solanine is best effected with 2 per cent.  $HCl$  solution; the resulting solanidine, m.p.  $207^\circ C$ ., judged

by its composition and molecular weight in phenol, possesses the formula  $C_{34}H_{57}O_2N$ . The hydrolytic fission of solanine is not complete, but, by allowing for the unaltered solanine, and measuring the extent to which the resulting sugars affect Fehling's solution, it is calculated that each molecule of solanine gives one molecule each of solanidine, dextrose, galactose, and rhamnose. Heating with ethyl iodide in alcoholic solution failed to effect the introduction of the ethyl radicle, and attempts at acetylation failed to give any definite product. The dehydration of solanidine by concentrated HCl or other agents yielded not only solanidine,  $C_{34}H_{55}ON$ , but also a base intermediate between this and solanidine probably derived from solanidine by the elimination of a semi-molecular proportion of water. Solanine was also found to form an additive compound with phytosterol, and also, when heated, to evolve vapours which redden a pine shaving. An examination of solanine from the *Palo Natri* of Chile showed this substance to be identical with the product from potatoes. (See also *Y.B.*, 1906, 72; 1908, 184, and *Gen. Index*.)

**Sparteine, Microchemical Reactions of.** O. T u n m a n n (*Apoth. Zeit.*, 1917, 32, 100, through *J. Chem. Soc.*, 1917, 112, ii. 518.) A 1-2 per cent. solution of sparteine when treated with a drop of dilute  $CrO_3$  solution gives immediately a pale yellow precipitate consisting of small droplets; after a short time these change to a mass of colourless needles which speedily become straw-yellow; single well-defined prisms are also formed. 0.1 Mgm. of the alkaloid yields after some time crystals united to form lattices, which slowly become transformed into prisms. The limit of sensitiveness is  $50 \mu$  Gm. With concentrated  $ZnCl_2$  solution (1:1), a white precipitate is formed consisting of aggregates of short rods. In presence of a trace of HCl, the white turbidity does not appear, but, after 15 minutes, individual prismatic crystals are formed which show marked polarization colours and extinction parallel to the long axis; limit of sensitiveness,  $0.4-0.3 \mu$  Gm. When the alkaloid is warmed with  $CuCl_2$  solution (4 per cent.) and HCl, long lemon-yellow prisms are gradually formed. The excess of  $CuCl_2$  (which is usually only deposited when the solution is completely evaporated) appears as colourless or pale green needles or prisms. The reaction is not very sensitive. With  $HgCl_2$  and HCl a white precipitate is formed, which is converted into rhombic

prisms. With small amounts of alkaloid, the precipitate does not appear, but after 20 to 30 minutes, individual prisms are formed. These are insoluble in EtOH and glycerin; the limit of sensitiveness is 30–40  $\mu$  Gm. HI gives a dark brown to black precipitate; under the microscope, long blackish-brown prisms or brown or red aggregates appear after some hours. The crystals are readily soluble in EtOH and attacked by glycerin. Limit of sensitiveness, 5–3  $\mu$  Gm. KI gives a brown precipitate, which is soon converted into brownish-black nodules, from which paler prismatic needles are formed; limit of sensitiveness, about 5  $\mu$  Gm. Potassium cadmium bromide [ $\text{CdBr}_2$  1 Gm.,  $\text{KBr}$  2 Gm., water 7 Gm.] yields colourless flat prisms, which are converted into dendritic aggregates. In addition, rhombic platelets and brown globules are formed. The crystal forms are very diverse and are insoluble in glycerin. Limit of sensitiveness, 8–5  $\mu$  Gm.

**Theobromine, Determination of.** N o r a h R a d f o r d and G. B r e w e r. (*Analyst*, 1917, **42**, 274.) The assay of theobromine by the Ag method of Kunze and also the modification of Monthulé, in which the amount of Ag precipitated is determined, is found to be unsatisfactory, the results being invariably too high. Correct results, however, may be obtained by determining the N in the Ag-theobromine compound by the Kjeldahl method.

Twenty-five Cgm. of the alkaloidal substance is taken, dissolved in water, and 5 c.c. of 0.880 ammonia. The solution is boiled, and to the boiling solution is added a hot solution containing 5 Gm. of  $\text{AgNO}_3$ . Any precipitate which forms will redissolve on the addition of a little more ammonia. The boiling is continued until the volume of the solution is about 10 c.c.; before this stage is reached a gelatinous precipitate, which gradually darkens in colour, will have been thrown out. This precipitate, after thorough washing by decantation till free from Ag, is transferred to the filter-paper. The filter-paper and precipitate are then treated according to Kjeldahl's method. Then, if 0.25 Gm. of the sample be taken, the percentage of theobromine is given by the following:

$$\left(\text{Vol. of } \frac{\text{N}}{10} \text{ HCl absorbed} \times 1.80104.\right)$$

A "blank" is made with the Kjeldahl reagents, and this correction is applied. (See also *Y.B.*, 1904, 174; 1911, 17; 1917, 126, 127; and *Gen. Index*.)



**Yohimbine and Quebrachine, Pharmacological Differences between.** E. F i l i p p i. (*Arch. Farmacol. Sperim.*, 1917, **23**, 107, 129, through *J. Chem. Soc.*, 1917, **112**, [i], 582.) Although from purely chemical evidence, Fournéau and Page considered yohimbine and quebrachine to be identical, a pharmacological comparison of the two alkaloids shows that although they are similar in many respects, yet in others they exhibit such marked differences that they cannot be considered to be identical, although belonging to the same pharmacological group. The chemical similarity of the two alkaloids with each other and with strychnine is further shown by the occurrence of Vitali's reaction. (See also *Y.B.*, 1908, 215; 1914, 24; 1915, 10; 1916, 29, 30.)

## ANIMAL PRODUCTS

**Ambergris.** J. L u n d. (*Tidskrift Kem. Farm. Terapi*, 1917, **14**, 254, through *Chem. Abst. Amer. Chem. Soc.*, 1918, **12**, 773.) Small pieces of ambergris taken from the spermaceti whale near New Zealand were extracted with  $\text{Et}_2\text{O}$ . The substance obtained in this way had a m.p.  $52^\circ$ ,  $n_D^{50}$  1.5028, saponification value 24, I value 78, acetyl value 45, and free acid 3 per cent. The residue from the  $\text{Et}_2\text{O}$  extraction amounted to 26 per cent., of which 20 per cent. was nitrogenous matter and 6 per cent. ash, chiefly  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$  and  $\text{CaCO}_3$ . (See also *Y.B.*, 1910, 39; 1912, 41; and *Gen. Index*.)

**Civet, Gum Acacia as an Adulterant of.** — S o u t h w a r d. (*Amer. Perfum.*, 1917, **12**, 169.) In the course of an interesting account of the production and commerce of civet in Abyssinia it is stated that gum acacia is used as an adulterant. It is believed, in Abyssinia, to defy detection. A thick mucilage is prepared and mixed with the civet. (See also *Y.B.*, 1905, 60; 1911, 44; 1912, 43; 1914, 25; and *Gen. Index*.)

**Mares' Milk, Analysis of.** A. H i l d e b r a n d t. (*Milchwirtsch. Zentr.*, 1917, **46**, 273, 289, 305, 317, through *J. Soc. Chem. Ind.*, 1918, **37**, 104A.) The milk from three mares was examined at intervals during the period April 4 to June 22, 1916; twenty-one analyses were made. The following are the

minimum and maximum results obtained. Sp. g.: 1.0296–1.0390; total solids, 8.84–12.03; fat, 0.10–3.35; non-fatty solids, 8.03–9.84; ash, 0.32–0.74; nitrogen, 0.31–0.49; lactose, 4.32–7.56 per cent. Generally, the milks did not give a per-oxidase reaction, but in one or two cases a feeble reaction was obtained.

[The minimum figure for fat is so low as to suggest some extraneous cause.—Ed. Y.B.]

**Milk, A New Protein, soluble in Alcohol, in.** T. B. Osborne, A. J. Wakeman, C. S. Leavenworth, and O. L. Nolan. (*J. Biol. Chem.*, 1918, **33**, 243, through *J. Soc. Chem. Ind.*, 1918, **37**, 220A.) When caseinogen is separated from milk, it is usually accompanied by another protein. The latter can be extracted from the caseinogen precipitate by treatment with EtOH, in which it is readily soluble. The composition and properties of the new protein are such as to differentiate it from all known types of proteins of vegetable or animal origin. The amount present in milk appears to be too small to be of much technical significance.

**Pepsin to replace Rennet.** D. W. Stuart. (*U.S. J. Board Agr.*, 1917, **24**, 313.) An attempt was made to prepare a pepsin solution which would keep fairly well and give results similar to those obtained with standard rennet extract. The pepsin solution was prepared by mixing  $4\frac{1}{8}$  parts by weight of a 1:3000 solution of pepsin, 1 part of  $H_3BO_3$ , and 10 parts of salt to 50 parts of water. In cheese-making experiments this pepsin solution compared favourably with rennet extract when well-ripened milk was used, but when the milk was ripened to a less extent the time of coagulation was much longer with the pepsin than with the rennet. The results of another test indicate that 1 oz. of soluble pepsin powder will curdle only 60 gallons of fresh milk.

**Pepsin, Milk-curdling Properties of.** H. T. Graber. (*J. Ind. Eng. Chem.*, 1917, **9**, 1125.) In comparative estimations of the rennetic activity of calf rennet and of pepsin from the hog's stomach, it was found that whereas the former never failed to coagulate fresh milk or to give comparable results when diluted, the latter usually failed to coagulate fresh milk and did not show an activity proportional to its dilution. Pepsin

was most active in milk of an acidity of 0.2 per cent. or more, whilst the activity of the rennin was not promoted by such high acidity. By bringing the acidity of fresh milk to 0.185 per cent. by the addition of lactic acid, the results were comparable with those produced in fresh milk by the rennet. This confirms the view that the two enzymic activities of pepsin are associated in a single molecule, and that on contact with milk and acid, or protein and acid, coagulation of the milk or hydrolysis of the protein is effected.

**Poisons and Drugs of Animal Origin.** G. Barger. (*J. Soc. Chem. Ind.*, 1918, **37**, 335.) An interesting review of animal toxic secretions, dealing with cobra venom, toad poison, salamander poison, bee sting toxin, the active principle of the adrenal and thyroid glands, of the pituitary gland, and, in a general manner, with sera and anti-toxins.

**Spermaceti, Sp.g. of.** — Lundin. (*Farmaceutisk Rev.*) — Jermstad. (*Schweiz. Apoth. Ztg.*, 1917, **55**, 221, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2386.) Spermaceti of sp.g. as demanded by Swedish Ph., is easily obtainable. The German Pharm. V limits of 0.940–0.945 are too narrow. Sp.g. may be determined rapidly by the usual hydrostatic methods, with the aid of dilute EtOH. They are preferable to Hager's flotation method.

**Thyroid, Active Constituent of ; its Isolation, Chemical Properties, and Physiological Action.** E. C. Kendall. (*J. Biol. Chem.*, 1917, **29**, xxix–xxx, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 3051.) Thyroid proteins are separated into two fractions by primary cleavage, one soluble and the other insoluble in acid. The I compound from the acid-insoluble fraction can be separated by means of the solubility of its Ba compound in  $\text{Ba}(\text{OH})_2$  and NaOH. Successive reprecipitations alternating with heating in NaOH and the action of  $\text{CO}_2$  are necessary and the final traces of impurities are removed by dissolving the product in alkaline EtOH and precipitating with AcOH. The active constituent separates in microscopic needles. It may be precipitated as the free base or in salt form ; the free base is insoluble in EtOH and contains 65 per cent. of I ; the sulphate is soluble in EtOH and has an I content of 60 per cent. Its



probable molecular weight is 586. The chemical properties depend upon the degree of purification.

**Thyroid Preparations, A Method for the Standardization of.** J. M. R o g o f f. (*J. Pharmacol.*, 1917, **10**, 199-208, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2912.) Standardization of thyroid by determination of its I content is not an entirely reliable indication of its therapeutic value. The I content of thyroid varies with the histological structure, and the physiological activity of the gland when administered is dependent upon the I which it contains in combination with its colloid. It is a simple matter to cause a hyperplastic, therapeutically worthless, specimen of thyroid to assay any amount of I by simply adding I (*in vivo* and *in vitro*) in any form. In other words, total inorganic I of the gland obtained by analysis is not necessarily "thyroid iodine" so far as thyroid action is concerned. A physiological method of assay is proposed. For this the specific effect on tadpoles of thyroid feeding described by Gudernatsch is utilized. Thyroid-fed tadpoles promptly undergo rapid metamorphosis into adult frogs. The method is simple and quite accurate; that is, the effects on growth and differentiation are in proportion to the quantity fed and amount of I present, and the reaction is so sensitive that it may even be superior to chemical methods. For details of keeping and feeding the tadpoles, and the administration of thyroid, the original must be consulted. A difference of 10 per cent. in activity could be detected. Cattle thyroid was taken as the standard. A number of commercial preparations were tested and found to vary from 10 to 50 per cent. from the active cattle thyroid.

**Wool Fat (Lanolin) Substitute and the Preparation of Cetyl Alcohol.** S. Axelrad. (*J. Ind. Eng. Chem.*, 1917, **9**, 1123.) Cetyl alcohol has been shown to be the most effective water combining constituent of the various lanolin substitutes introduced. Hitherto no practical details for its commercial preparation appear to have been published. The author finds that it may be obtained as follows: 20 Gm. of CaO containing about 5 per cent. water is added to 15 Gm. of melted spermaceti. The mixture is heated for about 6 hours, with occasional stirring. When cooled, the mass assumes a brown-yellow colour. On distilling this, frothing occurs at 100° C., due to the

escape of water. When the water has all been driven off the temperature is raised to  $340^{\circ}\text{C}$ ., when the cetyl alcohol distills as white fumes and on cooling forms oily drops, which became pure white upon solidification, the m.p. being  $49.5^{\circ}\text{C}$ . The yield obtained is over 6 Gm.

The following formula for a wool fat substitute for general pharmaceutical use was ultimately devised: 70 parts of soft paraffin, 20 parts of hard paraffin (m.p. about  $60^{\circ}\text{C}$ .), 10 parts of cetyl alcohol, 5 parts of lanolin (anhydrous), 100 parts of water. This preparation stood in the laboratory for 17 months with absolutely no change in appearance or working qualities. The properties of this mixture are the same as wool fat. The advantage over wool fat is that it will not become rancid and is considerably cheaper. The reason for using 5 parts of lanolin in the mixture was to have the "unctuous" property of wool fat. This, however, is a minor physical property. A cold cream having very desirable properties can be made by using the above formula except for the addition of 250 parts of water instead of 100. The petrolatum, cetyl alcohol, lanolin and paraffin are melted together. The water is warmed to the same temperature as the melted fats and added slowly with constant grinding so as to get a smooth mixture. (See also *Y.B.*, 1912, 225 ; 1916, 357, 358.)

## CLINICAL TESTS

**Amœba Cysts, Easy Method of Staining.** S. Oi. (*Taiwan Igakukai Zasshi*, 1917, [174], 249-55, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 919.) Cysts, which have been killed by heat or EtOH, are stained more readily than living cysts. The best stain is a saturated solution of I in 70 to 80 per cent. EtOH; cysts are stained golden yellow with slightly darker nuclei.

**Bacteria, Living and Dead, Differentiation of.** A. Nyfeldt. (*Nord. Med. Arkiv.*, 1917, 50, 184, through *J. Amer. Med. Assoc.*, 1918, 70, 662.) Dead bacteria stain prominently with  $\text{AgNO}_3$ , while living bacilli display no affinity for it. Experiments were made with 50 specimens of streptococci, colon bacilli, etc.,

leaving the bacteria in a 5 per cent. solution of  $\text{AgNO}_3$  for 24 hours, concluding with neutral red. The killed cultures show black, and only the living bacteria show red.

**Bacteriology of House Fly.** J. R. Scott. (*J. Med. Research*, 1917, **37**, 101, through *J. Amer. Med. Assoc.*, 1917, **69**, 1200.) Certain bacteria which might be of importance in the spread of infectious disease were isolated from the bodies and intestinal tract of flies. Other bacteria, while of themselves not pathogenic under normal circumstances, but which have been accepted as being indicators of dangerous contamination by excreta, were frequently found. Such organisms include the colon bacillus, indicating that the insect has recently come into contact with faecal excretions. The finding of the pyogenic cocci on flies suggests the possibility that this insect may be the agent in the transmission of suppurative organisms from man to man, and may afford an explanation of the spread of gangrene in field hospitals under war conditions. The following pathogenic organisms were isolated from these flies: *Staphylococcus pyogenes-aureus*, *albus* and *citreus*; *tetrangenus*, *B. acidilactici*; *B. coli-communis*; *B. coli-comunior*; *B. suipestifer*; *B. coli-anaerogenes*; *R. proteus-vulgaris*; *B. cuniculicida*; *Streptococcus fecalis* and *pyogenes*.

**Blood, Bile Pigments in, Detection and Determination of.** — Fouchet. (*J. Pharm. Chim.*, 1918, **17**, 19 and 29.) When the proteins of blood serum are precipitated by means of  $\text{C}_2\text{HO}_2\text{Cl}_3$  bilirubin is fixed by the albuminous precipitate which is slowly coloured green, due to the formation of biliverdin. On adding a little  $\text{FeCl}_3$  to the  $\text{C}_2\text{HO}_2\text{Cl}_3$  used, the reaction is almost instantaneous, and so definite that the method may be employed not only for detecting traces of bilirubin, but also for its approximate colorimetric determination. The formula for the reagent is:  $\text{C}_2\text{HO}_2\text{Cl}_3$ , 5 Gm.; water, 20 c.c.;  $\text{FeCl}_3$  solution, sp.g. 1.260, 2 c.c. The test may be made with 0.3 c.c. of serum and of reagent. The colour is matched against solutions of bilirubin of known strength. (See also *Y.B.*, 1916, 49.)

**Blood Counts, Diluting Fluid for.** J. Diner. (*J. Amer. Med. Assoc.*, 1917, **69**, 1421.) The solutions mentioned in textbooks for diluting blood counts have many drawbacks.



Some form a precipitate on standing ; others while remaining clear do not permit of the addition of staining solutions so that the white corpuscles may be differentiated from the red corpuscles while making the count ; still others destroy the red corpuscles if the diluted blood is permitted to remain in the counting pipette for some hours.

The following formula gives a fluid which permits of the simultaneous counting of white and red corpuscles : it keeps indefinitely without precipitating ; it retains the normal shape of the corpuscles, and the diluted blood kept in the diluting pipette for over a week was as perfect as when first drawn. NaCl, 0.85 Gm. ;  $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$ , 2.00 Gm. ; azure II, 0.001 Gm. ; formaldehyd solution, 3 drops. Distilled water enough to make 100 c.c.

**Blood, Determination of Calcium in the.** W. H. Jansen. (*Zeitsch. physiol. Chem.*, 1918, **101**, 176, through *J. Chem. Soc.*, 1918, **114**.) The blood (10 c.c.) is dried and incinerated. The ash is dissolved in HCl, nearly neutralized with AmOH, and the P and Fe removed by boiling with  $\text{AmC}_2\text{H}_3\text{O}_2$ . The Ca is subsequently precipitated as  $\text{CaC}_2\text{O}_4$  from the carefully neutralized filtrate. The precipitate is collected, and, after ignition in the usual way, the residual CaO is estimated by dissolving in a known volume of N/100 HCl and titrating the excess with alkali or by dissolving in 15 c.c. of N/100 HCl, adding 25 c.c. of water, 2 c.c. of a 1 : 10 KI solution, 4 drops of a 1 : 25  $\text{KIO}_3$  solution, and 2 drops of a 1 : 100 starch solution in 1 : 5 KCl solution, and then titrating with N/100 hypo solution until the blue colour just disappears.

**Blood, Human, Transcopia, a New Method for Detection of.** A. De Dominicis. (*Boll. chim. farm.*, 1916, **55**, 513, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 871.) This method is based on the fact that erythrocytes may be transferred by means of an EtOH-Et<sub>2</sub>O solution of celloidin, thus permitting identification of human blood by microscopical examination. A trace of thick celloidin solution (ordinary collodion may be used) is placed on the suspected blood spot and allowed to dry, the resulting pellicle being then removed by means of a lance needle. The pellicle is lightly compressed under a cover glass,  $\text{Me}_2\text{CO}$  saturated with eosin is introduced and the preparation is examined microscopically. The method may be modified in

several ways. The blood spot may be stained by means of eosin dissolved in celloidin before transferring with the latter. The best results were obtained in examining blood stains originally present on metals, weapons, stones, wood, earthenware and, in general, on non-absorbent surfaces. The margins of blood spots are best suited to microscopical examination; care should, therefore, be taken to transfer the marginal portions, and thin blood spots should be selected in preference to thick blood stains. Transfer of blood stains from textile and other absorbent materials is more difficult; thick celloidin in greater amount should be used in such cases. In transferring blood spots from paper, inclusion of superficial portions of the latter does not greatly interfere with examination. In transferring blood stains from surfaces to which varnish and similar material has been applied inclusion of small portions of the latter does not greatly interfere provided a larger amount of  $\text{Me}_2\text{CO}$  than usual is employed.  $\text{EtOH-Et}_2\text{O}$  mixture, as used in celloidin, is an excellent fixative for blood; the corpuscles are not altered in such a way as to affect measurement of their diameter. The same cannot be said of the gelatin preparations proposed by Maestre and Lecha Marzo for transfer of blood stains. (See also *Y.B.*, 1916, 50.)

**Blood in Urine and Faeces, Pyramidon as Reagent for.** — Thevenon and — Rolland. (*J. Pharm. Chim.*, 1917, 16, 18.) The following reagents are required: (1) Pyramidon, 5 Gm.;  $\text{EtOH}$ , 90 per cent., 100 c.c. (2) Glacial,  $\text{HC}_2\text{H}_3\text{O}_2$ , 1; distilled water, 2. To 3 or 4 c.c. of the unfiltered urine an equal volume of the pyramidon solution is added, then 6 to 8 drops of the acetic acid. After mixing 5 or 6 drops of  $\text{H}_2\text{O}_2$  (12 vols.) are added. A more or less pronounced violet colour will appear dependent on the amount of blood present. If this is only in traces it will require 15 minutes for the colour to be evident. Gastric and other secretions may be tested in the same manner. (See also *Y.B.*, 1907, 25, 26; 1908, 134, 202; 1910, 48, 52; 1911, 52; 1912, 49; 1913, 42, 54; 1916, 58.)

**Blood, Sensitive Test for in Faeces, with Rhodamine B.** E. Fuld. (*Biochem. Zeit.*, 1917, 79, 241; *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2213.) An especially sensitive reagent

is made from rhodamine B. extra by dissolving 0.2 Gm. of the dye in 50 c.c. of EtOH. adding 5 Gm. of Zn dust and 4 c.c. of 10 per cent. NaOH to the boiling EtOH solution. This, on the addition of 3 per cent.  $H_2O_2$ , gives a coloration with blood in a dilution of 1 in 10,000,000. (See also *Y.B.*, 1912, 52 ; 1913, 42 ; 1916, 58.)

**Blood Serum, Ca content of.** J. O. Haverson, H. K. Mohler and O. Berghheim. (*Proc. Soc. Exp. Biol. Med.*, 1917, 15, 11. through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 828.) The Ca content of human blood serum was determined in several normal and in a number of pathological conditions. In the normal cases values lying between 9 and 11 Mgm. of Ca per 100 c.c. were obtained. In nearly all of the pathological conditions studied, including cases where the blood clotted with extreme slowness, a similar range was observed, indicating a great constancy of this element in the blood serum. Distinct decreases were noted in cases of hemotogenous jaundice, eclampsia, pneumonia, and particularly uremia. In several cases of uremia, increase in serum Ca was noted on improvement in the clinical condition and following administration of Ca lactate. In a case of pernicious vomiting of pregnancy with severe acidosis, alkali administration decreased the Ca excretion to 8 per cent. of its original value. It is pointed out that as the red corpuscles are nearly free from Ca, determinations of this element in whole blood are of little value unless the relative volumes of plasma and corpuscles are known.

**Cholera vibrio, Chemical Affinities of.** L. Nicholls. (*Lancet*, 1917, 193, 563.) The *Vibrio cholerae* is relatively resistant to alkalies. The organisms remain alive in 1 per cent. peptone water containing 3.5 c.c. of N/NaOH to every 100 c.c. and even produce pellicle-like formations on the surface of the medium. The organisms grew abundantly in 48 hours in media containing 7.5 per cent. and 10 per cent. of N  $NaHCO_3$ . No growth of *B. coli* took place under these conditions. The resistance of the vibrio in the alkalies has its counterpart in its susceptibility to the action of acids. The organism is killed in 30 minutes in a solution of peptone water which contains 1.5 per cent. of N/HCl. It is not so readily destroyed in a broth solution of this acidity. The explanation of this may be that the acid has formed acid salts to which the organism is more resistant. Many organic



acids, such as lactic, butyric, caproic, and propionic, were tested and gave very similar results. Most organisms are very resistant to the acid salts. *B. coli communis* will flourish in a medium containing 2 per cent. of  $\text{NaH}_2\text{PO}_4$ , and it is not destroyed in 24 hours in 7.5 per cent. solution of this salt. The cholera vibrio is relatively as susceptible to acid salts as it is to the action of acids. The antiseptic properties of many aniline dyes are especially active on *Vibrio cholerae*. Among those tested, brilliant green was by far the most effective. This organism did not grow in a dilution of 1 : 1,000,000 of this. *B. dysenteriae* (Shiga) and *B. coli communis* produced opacity of the broth in 48 hours in a dilution of 1 : 80,000, and *B. typhosus* grew well in 1 : 40,000 and in 1 : 80,000 in 24 hours, and in 72 hours produced considerable opacity in the media in dilutions up to 1 : 4000. Many alkaline media have been used for the isolation of the vibrio. The best known of these is Dieudonné's alkaline serum agar. An excellent medium for subcultures is prepared by saturating nutrient agar with  $\text{CaO}$ , filtering, and then bubbling  $\text{CO}_2$  through the medium until most of the lime is precipitated as  $\text{CaCO}_3$ . When this medium is filtered again it will be found to be alkaline to litmus. The cholera vibrio grows luxuriantly upon this medium.

**Cholesterol, Two Forms of.** J. Lifschütz. (*Biochem. Z.*, 1917, **83**, 18, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 809.) Cholesterol crystallizes in two forms, and the newly described variety is in the form of elliptical leaves which melt  $5^\circ$  below the ordinary crystals. Cholesterol from brain is mainly, and from the blood wholly, of the new kind. In liver and pancreas, the crystals are chiefly of the rhomboid shape, but in kidney chiefly of the elliptical variety.

**Crystals in the Blood as Determining Date of Death.** B. Valverde. (*Semana Med.*, 1918, **25**, 121, through *J. Amer. Med. Assoc.*, 1918, **70**, 1576.) Microphotographs are given showing the varying aspect as time passes of certain characteristic crystals found in blood after death. These crystals are fragile and colourless; and their size is proportional to the interval since death, up to 35 days, and then they disappear. They are dissolved by acids but are not modified by bases or  $\text{EtOH}$ , and do not dissolve in water. They turn black under

a 5 per cent. solution of  $\text{AgNO}_3$ , and blue under  $\text{K}_4\text{Fe}(\text{C}_2\text{O}_4)_6$ . These crystals are always found in putrefying blood, and sometimes even in aseptic blood. They appear the third or fourth day or even earlier in summer, the fifth or sixth day in winter. Their disappearance by the thirty-fifth day aids in determining the date of death. The crystals were found the fourth day in blood drawn from a living person, but a dried spot from a drop of his blood did not show the crystals till the fifteenth day. They have straight sides but coffin-like ends, and increase in size from less than one-twelfth to over half the diameter of the microscopic field.

**Diphtheria Bacilli, Rapid Cultivation of.** S. Costa, J. Troisier and J. Dauvergne. (*Bull. Soc. Méd. Hôp.*, 1917, **41**, 991, through *J. Amer. Med. Assoc.*, 1918, **70**, 198.) The method is based on the fact that diphtheria bacilli alone in their class attack glucose and turn litmus red. Control tests in nearly a hundred cases have confirmed the prompt and reliable findings with this method. Results were particularly satisfactory in the carriers whose scanty bacilli it was difficult to detect with other methods. The culture medium is a mixture of 100 c.c. horse serum : 10 c.c. of a 30 per cent. sterilized solution of glucose ; 30 drops of concentrated and sterilized tincture of litmus : 3 c.c. of 1 per cent. solution of  $\text{H}_2\text{SO}_4$  (10 Gm. per 1000). This mixture is distributed in flat Petri boxes, 10 or 12 c.c. to the box. It is coagulated in the autoclave or with dry heat, very slowly raising the temperature to 75 and 80° C. and keeping this up for an hour and a quarter. Then the boxes are turned over and covers lifted to expel any condensed moisture, and they are then dried. They can be kept for several days. The medium is blue with a slight greenish tinge, transparent, firm and elastic. It is inoculated with a triangular loop of Pt passed over the end of the cotton with which the throat has been swabbed. The loop is then dragged along the surface of the medium in parallel segments until all is smeared. The boxes are then incubated at 37° C., the cover below. In 24 hours the true diphtheria bacilli colonies show as transparent red pinheads. The false diphtheria bacilli do not attack glucose or modify the litmus tint. They show as opaque, grey, creamy colonies, while streptococci and pneumococci persist as merely punctiform colonies. Staphylococci sometimes turn the medium red, but the aspect of the colonies is different and the micro-

scope will settle their identity. The findings with this method are so distinct and reliable that one box can be made to answer for two specimens. (See also *Y.B.*, 1913, 41 ; 1915, 39.)

**Distilled Water, Acid-Fast Organisms in.** R. A. Keilty. (*J. Med. Research*, 1917, 37, 183, through *J. Amer. Med. Assoc.*, 1917, 69, 1200.) Distilled water may be divided into sterilized, clean, and dirty. Sterile distilled water is free from all bacterial bodies. Distilled water may be contaminated in the still, the tank or collecting bottle, and show different types of organisms, including acid-fasts in most instances. The acid-fasts may or may not be morphologically like the tubercle bacillus. The older the distilled water is and the larger the amount of sediment present, the greater the number of acid-fasts will be found. In perfectly clean but non-sterile distilled water acid-fasts may appear after standing for a month. In all bacteriologic work it is advisable to use sterile distilled water collected in sterile stills, tanks, and bottles.

**Dysentery Bacilli, Diagnosis of, by Means of Arbutin.** B. GOSIO. (*Ann. d'igiene*, 1917, 27, 213, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 3046.) By adding arbutin in the proportion of 1 to 200 to ordinary agar media, a method is found for the differentiation of various species of bacteria. While *B. pyocyaneus*, *B. coli* and *paracoli*, and similar para-dysenteric organisms quickly darken the medium by their action on the arbutin, with liberation of hydroquinone, *B. typhosus*, the two para-typhoids, *B. anthracis*, *B. pestis* and *Streptococcus pyogenes* do so much more slowly, and the true dysentery bacilli, both Shiga-Kruse and Flexner, do not react at all. The medium, therefore, remains colourless in the latter case.

**Eosin-Methylene Blue Stain.** — Billemaaz. (*L'Union pharm.*, 1918, 59, 33.) The following gives a most useful stain for pathological work. *Solution A.* Methylene Blue, 1 Gm. ; borax, 3 Gm. ; water, 100 c.c. *Solution B.* Water-soluble eosin, 1 Gm. ; water, 100 c.c. Mix 20 c.c. of A with 10 c.c. of B. Set aside for 24 hours. Collect the precipitate, wash it quickly and dry. Dissolve the dry precipitate in MeOH 30 c.c. Filter, and add borated glycerin 1 : 20, 2 c.c. Keep in a well-stoppered bottle. Preparations should not be fixed, but treated directly on the slide with 10 or 15 drops of the solu-



tion. Set aside for 5 minutes under an inverted Petri cover. Then add 8 or 10 drops of distilled water containing a trace of borax. Wash with water, and if the object appears overstained wash quickly with EtOH and then with water. Drain with filter paper. This stain is specially valuable in haematology. It colours each element of normal or abnormal blood in a distinctive manner and also stains blood parasites and the organisms present in paludism.

**Faeces, Detection of Occult Blood in.** W. G. Lyle and L. J. Curtman. (*J. Biol. Chem.*, 1918, **33**, 1, *J. Amer. Med. Assoc.*, 1918, **70**, 417.) The method has been used in the examination of over 500 stools tested for occult blood with satisfactory results. Approximately 10 Gm. of the stool is transferred to a beaker, 25 c.c. of distilled water is added, and the mixture is stirred until of uniform consistence. It is then heated to boiling over a low flame, with constant stirring, and kept at the boiling temperature for several minutes. After cooling, one-half is transferred to an 80 c.c. glass-stoppered bottle, 5 c.c. of glacial  $\text{HC}_2\text{H}_3\text{O}_2$  and 25 c.c. of  $\text{Et}_2\text{O}$  are added, and the mixture is thoroughly shaken and allowed to stand for several minutes. In a test tube, 2 c.c. of the  $\text{Et}_2\text{O}$  extract is treated with 0.5 c.c. of guaiaconic acid solution (1 : 60), and finally 1 to 5 drops of 30 per cent. perhydrol are added slowly from a pipette. A decided green, light or dark blue, or purple colour indicate the presence of blood in quantity to be of clinical significance. (See also *Y.B.*, 1916, 58.)

**Gastric Secretion, Chemical Examination of.** I. M. Kolthoff. (*Pharm. Weekblad*, 1917, **54**, 1192, 1253, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 281.) One of the most important points in the examination of stomach juices is the determination of the  $\text{H}^+$  concentration. For theoretical work, the only accurate method is the use of the H electrode; but in practice, colorimetric methods give satisfactory results. The best indicator is tropeolin, which has its acid tint when  $\text{H}^+ = 0.033 \text{ N}$ , and its alkaline tint when  $\text{H}^+ = 0.001 \text{ N}$ . Thus, the acid tint indicates hyperacidity, the alkaline tint hypoacidity, of the stomach juice. Dimethyl yellow and methyl red, in 2 per cent. EtOH solution, are also satisfactory indicators. Much of what is usually termed "free HCl" is really fixed by albumin, but strongly hydrolysed. Congo

paper, though often used to detect free HCl, is far from sensitive enough in media containing albumin. Günzberg's test, using phloroglucinol and vanillin, is quite sensitive (0.005 to 0.01 per cent. HCl), but does not give the test with weak acids such as lactic acid. For organic acids, a general qualitative test is usually applied; but this is not sensitive enough. Specific tests should be made for  $\text{HCO}_2\text{H}$ ,  $\text{HOAc}$ ,  $\text{PrCO}_2\text{H}$ , valeric and lactic acids. Total acidity is best determined by titrating with methyl red; in absence of organic acids, this gives the HCl content directly. In presence of organic acids, total HCl is determined as  $\text{BaCl}_2$ . In this case the  $\text{NH}_3$  content must be accounted for, since any  $\text{NH}_4\text{Cl}$  present is changed to  $\text{BaCl}_2$ . (See also *Y.B.*, 1907, 71; 1910, 47, 48; and *Gen. Index.*)

**Gastric Secretion, Determination of Cl in.** — Georges and — Fabre. (*J. Pharm. Chim.*, 1918, 17, 14.) In the method of Hayem and Winter, which is the process usually employed in this determination, three successive determinations, of the total Cl, of the Cl combined at  $100^\circ \text{C}$ ., and the fixed Cl, are made. For the two former, the determination of Cl is made after incinerating the residue with  $\text{Na}_2\text{CO}_3$  and  $\text{NaNO}_3$ , to destroy organic matter. Frequently loss of Cl occurs, due to deflagration. The authors have successfully applied the  $\text{KMnO}_4$  method of Laudat for destroying organic matter in blood serum to the same purpose with gastric secretion. The following is the outline of the method. Ten c.c. of the filtered gastric secretion is placed in each of 3 porcelain capsules. To the first, 10 c.c. of  $\text{N}/10$   $\text{AgNO}_3$  solution, 6 c.c. of saturated  $\text{KMnO}_4$  solution and 10 c.c. of pure  $\text{HNO}_3$  are added. On heating a clear liquid is obtained, with a precipitate of  $\text{AgCl}$ . When cold the amount of uncombined  $\text{AgNO}_3$  is titrated with  $\text{N}/10$   $\text{KCNS}$  solution, using iron alum indicator. The result of total Cl is expressed in terms of  $\text{NaCl}$  per litre.

The second capsule is evaporated on the waterbath and dried thereon for an hour. The residue is then treated as above. The result of the titration gives the Cl combined at  $100^\circ \text{C}$ ., which is expressed in similar terms.

The evaporation residue of the third capsule is cautiously incinerated. The solution of the ash on titration gives the amount of fixed chlorine also expressed as  $\text{NaCl}$  per litre.

It is found that when the total acidity of gastric secretion is determined, and a portion of the sample is left exposed in

*vacuo* for 4 days, the amount of acid will be practically unaltered, if  $\text{HC}_2\text{H}_3\text{O}_2$  is absent. This confirms the view that HCl does not occur in a free state in the stomach, but in a more or less stable combination with the digestion products of albuminoids. (See also *Y.B.*, 1907, 71, and *Gen. Index.*)

**Renal Permeability, Phlorizin Test for.** M. Krotosyner and W. E. Stevens. (*J. Amer. Med. Assoc.*, 1917, **69**, 1865.) The following method of employing phlorizin gives accurate results in a short time, enabling a correct diagnosis of renal permeability to be arrived at. The glucoside is prepared in tablet form, each tablet containing phlorizin 0.01 Gm. and NaCl 0.02 Gm. This tablet is introduced into the syringe, and 2 c.c. of hot water is drawn up. As soon as solution is effected, the liquid is administered by intra-muscular injection. This method is more accurate than the use of readily prepared stock solutions or ampoules, since these deteriorate in phlorizin strength more or less rapidly. In normal cases sugar appears in the bladder urine within 7 minutes of administration and within 5 minutes in renal urine. The maximum of sugar excretion sets in within a few minutes, and the sugar disappears within 45 minutes after the injection. In pathological cases, the appearance of sugar is considerably delayed, no sugar appearing for 15 minutes. The value of the test for total permeability (bladder test) is limited. The prompt appearance of sugar generally indicates normal function, and persistently delayed appearance is characteristic of impaired renal function. Quantitative determination of the total sugar is useless. As a test for comparative renal function between the two kidneys phlorizin gives more accurate and reliable results than phenolsulphonaphthalein.

**Skin Ink for Radiography.** N. S. Finzi. (*Brit. Med. J.*, 1918, **I**, 52.) Pyrogallol 1 Gm., EtOH 90 per cent. 10 c.c., liq. ferri perchlor. fort. 2 c.c., acetone 20 c.c.

**Spirocheta pallida, Silver Impregnation of, without Precipitate in Film.** A. C. Holland. (*Compt. rend. soc. biol.*, 1917, **80**, 7, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 814.) The Fontana-Tribondeau method is modified by using a pyridine instead of AmOH solution of  $\text{AgNO}_3$  and also by modifying the solution of tannin employed, thus securing rapid

and complete solution of the hemoglobin of erythrocytes. The tannin solution is prepared from 5 Gm. of tannin, 5 c.c. of glacial AcOH, 50 c.c. 96 per cent. EtOH, and 50 c.c. distilled H<sub>2</sub>O. The AgNO<sub>3</sub> solution is prepared from 5 Gm. of AgNO<sub>3</sub> and 100 c.c. of distilled water, 2 c.c. of C<sub>5</sub>H<sub>5</sub>N being added after solution of the AgNO<sub>3</sub>; the solution, which is colourless and which keeps well, is separated by decantation from the crystalline precipitate (probably a compound of C<sub>5</sub>H<sub>5</sub>N and Ag) which is formed after several hours. The method is as follows: The specimen is air-dried and then treated with several drops of 96 per cent. EtOH. Tannin solution is next added and the preparation is heated for a minute or so over a small flame; tannin solution is again added and the operation is repeated. The preparation is then washed with water to remove tannin, treated with the C<sub>5</sub>H<sub>5</sub>N-AgNO<sub>3</sub> solution and gently heated, care being taken to prevent boiling; more AgNO<sub>3</sub> solution is added and the operation is repeated. Under these conditions only the protein portions of the preparation reduce the C<sub>5</sub>H<sub>5</sub>N-AgNO<sub>3</sub> solution; the supernatant liquid remains clear. The preparation shows no precipitate under the microscope and the spirochetes appear brownish black on a pale yellow background. (See also *Y.B.*, 1916, 59, 61; 1917, 38.)

**Tubercle Bacilli in Sputum, Virulence of.** R. J. Cooper. (*J. Amer. Med. Assoc.*, 1918, 70, 1281.) The question is discussed as to whether all the bacilli found in sputum from open cases of tuberculosis are virulent. As the result of experiments which are recorded, it is concluded that in the majority of cases the bacilli which were capable of being isolated on artificial media were sufficiently virulent to produce systemic tuberculosis in guineapigs in doses as small as 0.000001 Mgm., and that the range of virulence is very small. If the virulence of these cultivated bacilli is a direct expression of their virulence in sputum, it is evident that the bacilli discharged from open cases by droplets or expectoration are a danger to mankind through direct transmission at least. These bacilli are nearly all pathogenic and at least 97 per cent. will cause human infection.

**Tubercle Bacilli, New Selective Stain for ("Methylene Lacto Blue").** C. Cépède. (*Comptes rend.*, 1918, 166, 356.) This



stain gives excellent results, and differentiates the alcohol-acid resistant Koch's bacillus from the simple acid resistants such as the smegma bacillus. It is therefore specially useful for the detection of the tubercle bacillus in urine. Lactic acid, 40 c.c. : water, 160 c.c. : EtOH 95 per cent., 800 c.c., is saturated with an excess of methylene blue. To avoid filtration the methylene blue may be tied up in a bag and macerated in the liquid. Or if preferred a saturated solution in the lactic acid and water may be kept. Before use 1 volume of this is mixed with 4 volumes of EtOH 95 per cent. The smear or preparation is first fixed and stained in the usual manner with carbol fuchsin, with steaming, for 5 minutes. It is then counterstained, at once, without washing with the lacto blue. After 2 or 3 minutes the stain is washed off in water. The object should have a uniform blue tint. If any thicker parts are still reddish, the blue must again be applied. In the case of urinary examinations a slight modification is made. The preparation is first treated for 5 to 10 minutes with NaOH solution containing 5 per cent. of EtOH. This saponifies the fat of the smegma bacillus, and thus destroys its acid resistance, while it does not affect the wax-covered tubercle bacillus. This lacto blue counterstain enables the tubercle bacillus to be detected in all pathological material in which it is present. (See also *Y.B.*, 1917, 39.)

**Tubercle Bacilli, Simple Method of Staining by the Ziehl Neilsen Process.** L. Tribondeau. (*Comptes rend. Soc. Biol.*, 1917, 780, through *L'Union pharm.*, 1917, 374.) The following method gives excellent results in the hands of those who are not skilled bacteriologists. The smear of sputum is dried and fixed on the slides in the usual manner. It is then covered with a fairly deep layer of Ziehl's stain, and warmed over a flame until steaming occurs, but taking care not to boil. Any part of the smear which becomes denuded of liquid during this process should again be wetted therewith by means of a point rod or Pt wire. Repeat this warming three times in succession, taking about 3 minutes in all. A golden metallic pellicle should show on the surface of the stain. Excess of stain is then thrown off, and without washing, the smear is covered with a mixture of  $\text{HNO}_3$  sp.g. 1.394, 1 vol., distilled water, 2 vols. This is washed round over the smear with two or three circular movements, and rejected. Another portion of acid is at once put on, and again washed round. The washings are thus continued

until the acid acquires only a faintly yellowish tint. The smear is then at once washed in running water, when the preparation will have a violet shade, with red in the thicker parts. These different depths of staining are disregarded and the preparation is at once washed with EtOH 90 per cent. When the EtOH after moving about over the smear becomes coloured, it is rejected and replaced by fresh, until the washings show only a faint pink tint. The slide is then quickly washed in running water, and the preparation is covered either with picric acid stain (saturated aqueous solution of picric acid and EtOH 90 per cent. equal volumes) or with methylene blue solution (pure medicinal methylene blue 0.5 Gm., distilled water, 150 c.c.). After 5 or 6 seconds' contact the stain is washed off and the preparation dried and mounted. All the elements present will be found to be stained pale yellow when picric acid counterstain is employed, except the tubercle bacilli, which will be red. If some differentiation of the cellular elements and other bacteria besides tubercle bacilli is desired, then the counter-stain with methylene blue should be used. The Ziehl stain should be made as follows: Crush 1 Gm. of basic fuchsine in a mortar. Add 5 Gm. of crystalline phenol; crush together until the mass liquefies. Then add 10 c.c. of absolute EtOH and triturate until perfect solution results; finally add 85 c.c. of distilled water. Filter into drop reagent bottles. In institutions where large quantities of the reagent are required this may be made in a concentrated form: Fuchsine, 20 Gm.; phenol, 100 Gm.; absolute Et<sub>2</sub>O, 200 c.c.; distilled water to 400 c.c. One volume of this with 4 vols. of distilled water gives 5 vols. of Ziehl's stain.

**Urinary Sediments, Method of Staining.** C. Minerbi. (*Rivista Crit. Clin.*, 1917, **18**, 518, through *J. Amer. Med. Assoc.*, 1918, **70**, 818.) After centrifugating and rejecting the clear supernatant liquid, a droplet of egg albumin or of blood serum is taken up on a Pt loop, and plunged in the liquid residue and well mixed. Then the mouth of the tube is slanted on the slide and a droplet of the mixture spread over the latter. Two other slides are thus prepared. Before drawing out the sediment the loop is singed to remove any adhering trace of albumin. The material is then fixed and stained with the May-Gruenwald-Giemsa stain. This addition of albumin or serum acting as a fixative gives very satisfactory results.

**Urine Analysis, Improved Fehling's Solution for.** D. Sider-ski. (*Annales Chim. analyt.*, 1917, **22**, 170.) In the determination of sugar in urine, by means of boiling with Fehling's solution, difficulty is often encountered with certain urines in determining the end point of the titration due to the slow separation of the  $\text{Cu}_2\text{O}$ . The presence of a Mg salt in the reaction mixture obviates this, and causes the rapid aggregation of the precipitate. It is therefore suggested to add  $\text{MgSO}_4$  to the Fehling's solution employed. The formula recommended is: (No. 1)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , 34.64 Gm.;  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 5 Gm.; water to 500 c.c. (No. 2)  $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ , 173 Gm.;  $\text{NaOH}$ , 60 Gm.; water to 500 c.c.

**Urine, Detection and Determination of Sugar in, with Copper Phosphate Reagent.** O. Folin and W. S. McEllroy. (*J. Biolog. Chem.*, 1918, **33**, 513, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 1059.) Alkaline phosphates can hold  $\text{Cu}(\text{OH})_2$  in solution and possess distinct advantages as constituents of reagents for sugar. They are less expensive than tartrates, citrates or glycerol, do not reduce sugar, and tend to regulate the degree of alkalinity at a lower level of  $\text{OH}$  ion concentration than is obtained by carbonates alone. *Qualitative test for sugar in urine.* Prepare the reagent as follows: Dissolve 100 Gm. of U.S.P.  $\text{Na}_4\text{P}_2\text{O}_7$ ; 30 Gm. of crystalline  $\text{Na}_2\text{HPO}_4$ , and 50 Gm. of anhydrous  $\text{Na}_2\text{CO}_3$  in about 1 litre of water. Add to this a solution of 13 Gm. of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in 200 c.c. of water. The solution keeps indefinitely except that some phosphate may crystallize out if the solution is kept in too cool a place. The solution is used exactly as is Benedict's reagent: to 5 c.c. of the reagent in a test tube are added 5-8 drops (not over 0.5 c.c.) of urine and the mixture is boiled for one minute or heated in a boiling water bath for 3-5 minutes. The test is as sensitive and reliable as Benedict's and a trifle more prompt. Unless a very marked turbidity is noted in the hot solutions, the results must be regarded as clinically negative, the slight turbidity appearing on cooling representing only the slight reducing action of normal urine. *Quantitative titration of sugar in urine.* The only solution required contains 60 Gm. of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  and 4 c.c. of strong  $\text{H}_2\text{SO}_4$  per litre, the latter preventing slight precipitation of  $\text{Cu}(\text{OH})_2$  or silicate. Five c.c. of this solution is equivalent to 25 Mgm. of dextrose or levulose, 45 Mgm. of anhydrous maltose or 40.4 Mgm. of anhydrous lactose. A dry mixture also is required containing 100 Gm.

$\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ , 60 Gm. anhydrous  $\text{Na}_2\text{CO}_3$  and 30 Gm. of  $\text{NaSCN}$  or  $\text{KSCN}$ . The salts are ground together in a mortar, allowed to remain in the mortar covered with paper overnight, stirred up again and bottled. The titrations are made in test tubes with the following advantages: the cost of chemicals is greatly reduced, less than 1 Gm. of  $\text{KSCN}$  being used for each titration: the preliminary heating period is very short; the flame need not be regulated to some definite speed of boiling as this is accomplished by moving the test tube sidewise through the flame; the disappearance of the last traces of blue colour is more sharply marked on account of the small volume; there is little or no return of any blue or green colour at the end of the titration. Undiluted urines are used even when sugar is as high as 6-7 per cent. This is made possible by attaching to the tip of an ordinary 25 c.c. glass-stoppered burette another tip consisting of a glass tube drawn out at one end to an almost capillary bore delivering 45-55 drops of urine per c.c. The measurement of a fraction of a c.c. can be made with almost as great an accuracy as that of 5 c.c. with an ordinary burette. The burette carrying the accessory tip should be filled from the bottom by suction like a pipette; this eliminates the necessity of rinsing the burette with the solution to be titrated, avoids all spilling and foaming within the burette and the necessity of waiting for the meniscus to reach the proper level. A 5 per cent. urine can be used directly after a 0.5 per cent. one and vice versa. Fill the burette to the zero mark by suction. Into a test tube introduce a pebble, 5 c.c. of the  $\text{CuSO}_4$  solution and 4-5 Gm. of the dry salt mixture. Shake and heat until a clear solution is obtained. Add 25 drops of the urine and boil *very gently* for 2 minutes. If reduction is complete the urine contains more than 5 per cent. and the determination must be started over again. If only a small amount of white precipitate is obtained, add from 10 to 25 drops more of urine, depending on the amount of remaining unreduced  $\text{Cu}$ , and boil *gently* for another minute. If most of the  $\text{Cu}$  has been reduced at the end of the second boiling, complete the titration by the drop system, keeping count of the number of drops added and boiling 1 minute after each addition. At the end of the titration determine how many drops are required to give a vol. of 1 or 2 c.c.

**Urine, Detection of Albumin in, by Bleaching Powder Solution and  $\text{HCl}$ .** Potjan and Steffenhagen. (*Deutsch. med.*



*Woch.*, 1917, **43**, 530. through *J. Chem. Soc.*, 1917, **112**, [2], 520.) A few c.c. of urine is slowly added to a mixture of bleaching powder solution (5 per cent. : 4-6 c.c.) with two drops of pure HCl. In the presence of albumin, an immediate, blue, opalescent turbidity is produced in which the albumin, according to the quantity, is more or less densely coagulated. Less than two drops of HCl do not ensure the complete solution of the alkaline earths. The reaction is as sensitive as the  $\text{HC}_2\text{H}_3\text{O}_2\text{-K}_4\text{Fe(Cy)}_6$  or the sulphosalicylic acid test. It can be directly applied to cloudy urine, since the opalescence or precipitate is readily recognized even in these circumstances. (See also *F.B.*, 1915, 44; 1916, 69; 1917, 43.)

**Urine, Detection of Emetine and other Alkaloids in.** — Millon and M. François. (*J. Pharm. Chim.*, 1917, **16**, 211.) About 500 c.c. of urine is treated with 1 : 5  $\text{Pb(C}_2\text{H}_3\text{O}_2)_2$  solution in the proportion of 10 c.c. to each 100 c.c. of urine, and filtered. Excess of  $\text{Pb(C}_2\text{H}_3\text{O}_2)_2$  is removed from this filtrate by adding 5 Gm. of  $\text{Na}_2\text{SO}_4$  to each 100 c.c. After the  $\text{PbSO}_4$  has been removed by filtration the liquid is transferred to a separator, made slightly alkaline with  $\text{AmOH}$ , and shaken up for 15 minutes with 80 c.c. of a mixture of equal vols. of  $\text{CHCl}_3$  and  $\text{Et}_2\text{O}$ . After standing for 3 hours the  $\text{CHCl}_3\text{-Et}_2\text{O}$  is drawn off into a smaller separator and shaken out with 50 c.c. of water and 20 drops of HCl 1 : 5. After 3 hours the  $\text{CHCl}_3$  layer is run off; the aqueous portion made alkaline with  $\text{AmOH}$  and again shaken out with  $\text{Et}_2\text{O-CHCl}_3$ . The  $\text{Et}_2\text{-CHCl}_3$  layer is then withdrawn into a capsule, the  $\text{Et}_2\text{O}$  allowed to evaporate and the  $\text{CHCl}_3$  driven off on the water bath. The alkaloidal residue is taken up in 6 c.c. of water and 10 drops of HCl by gently warming. One c.c. of the solution is tested with Bouchadat's reagent, another c.c. is treated with  $\text{KI-HgI}_2$  solution. If positive general alkaloidal reactions are obtained with these two separate 1 c.c. portions of the original aqueous liquid are evaporated to dryness on the water bath in two small flat-bottomed glass dishes. A reagent is prepared by crushing 5 Gm. of  $\text{KMnO}_4$  in 5 drops of strong  $\text{H}_2\text{SO}_4$ . A drop of this is applied with a rod to the residue. In presence of emetine a violet colour is produced. To the other residue solution of  $\text{Am}_6\text{Mo}_7\text{O}_{24}$  5 Gm. in  $\text{H}_2\text{SO}_4$  4 drops is similarly applied. A greenish-yellow colour is confirmatory of emetine. It is stated that by this method the presence of 0.0005 Gm. of emetine may

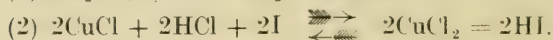
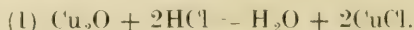
be detected. With slight modifications the method would doubtless serve for the extraction of other alkaloids for which appropriate identity tests could be applied to the final residue.

**Urine, Determination of  $\text{NH}_3$  in, by Means of  $\text{Li}_2\text{CO}_3$ .** A. Leclère. (*J. Pharm. Chim.*, 1918, **17**, 91.) The hydrolyzing action of  $\text{Li}_2\text{CO}_3$  when heated with urea and amino-acids is very slight; its action on  $\text{NH}_4$  salts is energetic under these conditions. Consequently the  $\text{NH}_3$  in urine may be determined with sufficient accuracy for all practical purposes by distillation with an excess of  $\text{Li}_2\text{CO}_3$ , collecting the distillate in a known volume of titrated acid. If the value of the  $\text{NH}_3$  nitrogen thus found is deducted from that of the total N obtained by means of the  $\text{NaBrO}$  test, the amount of true urea N is obtained. (See also *Y.B.*, 1909, 92; 1914, 33.)

**Urine, Determination of Pentose in.** G. Testoni. (*Policlinico*, 1917, **24**, 641, through *J. Amer. Med. Assoc.*, 1917, **69**, 75.) Ten c.c. of urine is decolorized by heating with a little blood charcoal, filtering, and evaporating to 5 c.c. This is mixed with 9 c.c. of a tepid 0.25 per cent. solution of phloroglucinol in glacial acetic acid, 1 c.c. of strong  $\text{HCl}$  is added and the mixture kept at  $50^\circ\text{C}$ . for 30 minutes. The characteristic colour reaction soon appears changing to a cherry-red. If the urine contains pentoses alone it is unnecessary to evaporate; merely add 15 c.c. of phloroglucinol solution and 2 c.c. of  $\text{HCl}$  to 1 c.c. of the urine and heat just to the boiling point. The test may be made quantitative by adapting it to a colorimetric method. It will detect the presence of 0.0005 Gm. of pentose even in diabetic urine.

**Urine, Determination of Sugar in, by Cammidge's Method.** R. W. Garrow. (*Pharm J.* 1918 [4], **46**, 148.) Cammidge (*Y.B.*, 1917, 42) gives a modified Scales' method for the estimation of sugar in urine, blood, and cerebro-spinal fluid. The reagent contains in 1000 c.c. 200 Gm.  $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$ , 100 Gm. anhydrous  $\text{Na}_2\text{CO}_3$ , 10 Gm.  $\text{NaHCO}_3$ , and 21 Gm.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . This solution is ten times as sensitive as Fehling's solution. The quantitative estimation is made by boiling a given quantity of the urine with a given quantity of the modified Benedict's solution;  $\text{HCl}$  is added to dissolve the  $\text{Cu}_2\text{O}$ ; it also liberates  $\text{CO}_2$ , which protects the  $\text{CuCl}$  from atmospheric oxidation. The  $\text{CuCl}$  solution

is added to a given quantity in excess of N/10 I solution, and the excess of I titrated with N/10 hypo, using starch solution as indicator. The reaction, which is not explained by the author, may be indicated by the following equations:—



This is found to give very accurate and concordant results.

It was noted that up to the point when the blue iodo-starch colour is discharged, the solution is perfectly transparent. But immediately after this first end-point is reached, a slight opalescence begins to appear, rapidly increasing until a dense white precipitate is produced. In a minute or two, and almost simultaneously with the formation of this colourless precipitate, the blue iodo-starch colour returns. This is discharged on adding more hypo solution, but in a minute or two it again returns, and this can be repeated until at last a final addition of hypo solution permanently discharges the blue colour. It will be seen by the equations already noted that the reaction involves oxidation of the CuCl with production of CuCl<sub>2</sub> and hydriodic acid. The subsequent precipitation of cuprous salt with simultaneous liberation of I may be accounted for by an interaction between the CuCl<sub>2</sub> and the HI in a manner analogous to the well known action of KI on CuSO<sub>4</sub> solutions thus:—



The change taking place may be thus written:—



The equations are purely explanatory, and state as simply as possible the nature of the reaction. It will be seen that this reaction is a reversible one, and that for the purpose of the sugar determination the end-point must be read when the blue colour first disappears and the turbidity is evident.

**Urine, Determination of the Total Acidity of.** W. M. Dehn. (*J. Amer. Chem. Soc.*, 1917, **39**, 2726.) Ammonium carbonate as formed from urea by bacterial ureases is decomposed by the acids present in acid urines. The liberated CO<sub>2</sub> may partially or completely escape, while the NH<sub>3</sub> forms salts with the free acids, and ultimately the urine becomes neutral, and any further

formation of  $(\text{NH}_4)_2\text{CO}_3$  tends to remain as such, until hydrolyzed.  $\text{CO}_2$  being more volatile than  $\text{NH}_3$ , the urine will finally become alkaline. These changes take place rapidly after the urine is excreted, and in all cases the alkaline stage is reached in a day or two, the  $\text{NH}_3$  found completely masking the original acidity. The method suggested for obtaining the total acidity of urine is as follows: Ten c.c. of the urine is distilled in a 500 c.c. flask with 10 to 100 c.c. of  $\text{N}/10 \text{ H}_2\text{SO}_4$ . The volume of acid taken should be such as to maintain the solution colourless to a little solid phenolphthalein throughout the distillation, which is continued until all but 5 to 10 c.c. has been collected as distillate. After cooling, a measured volume of  $\text{N}/10 \text{ NaOH}$  is added to the residue in the flask sufficient to maintain the solution alkaline to the phenolphthalein present. Distillation so continued until all the  $\text{NH}_3$  is expelled, at which stage only about 5 c.c. of liquid is left in the flask. This residue is cooled, added to the first distillate, and titrated with  $\text{N}/10 \text{ H}_2\text{SO}_4$  and litmus paper. The sum of the  $\text{N}/10 \text{ NaOH}$  used in the various operations minus the  $\text{N}/10 \text{ H}_2\text{SO}_4$  is equal to the acidity of 10 c.c. of urine in terms of normal acid. By this procedure the complete elimination of  $\text{CO}_2$  and ammonia is assured without loss of urine acids other than  $\text{CO}_2$  since during the first distillation carbonic acid is dissipated, and any volatile acids of urine such as benzoic, acetic, etc., which are more or less completely carried over, are added to the residue before final titration. Since  $(\text{NH}_4)_2\text{CO}_3$  and ammonium salts are volatile in steam, the first (acid) distillation is necessary not only to expel the  $\text{CO}_2$ , but also to prevent  $\text{NH}_3$  from being carried over as easily hydrolyzed and volatilized salts, for an acid urine distilled without further addition of acid may yield an acid, neutral, or an alkaline distillate depending on the  $\text{NH}_3$  concentration of the urine. As regards the second distillation unless all the  $\text{NH}_3$  originally present or derived from bacterial or hydrolytic decomposition is expelled, it will neutralize an equivalent quantity of original acid or  $\text{N}/10$  acid added in the first distillation, and it is for this reason that all previous methods for determining acidity especially with aged urines have yielded too low results. This applies not only to direct titration methods, but also to hydrogen-ion concentration methods based on indicators.

**Urine, Methylene-blue a Sensitive Reagent for the Detection of Picric Acid in.** Rozier. (*Bull. Sci. Pharmacol.*, through



*J. Chem. Soc.*, 1918, **114**, [II], 177.) The urine is treated with normal  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$  and filtered: 4 c.c. of the filtrate are placed in a test-tube, one drop of 0.5 per cent. methylene-blue solution is added, and the mixture is shaken with 1 c.c. of  $\text{CHCl}_3$ . After separation, the chloroform layer has a green colour if picric acid or picramic acid are present in the urine; in their absence, the  $\text{CHCl}_3$  is coloured blue. The test will detect the presence of 2 Mgm. of picric acid per litre of urine.

**Urine, New Method for the Determination of Glucose in.** J. J. Gurtov. (*Med. Record*, 1917, **92**, 502, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 3293.) The reagent has the following composition:  $\text{CuSO}_4$  10 Gm.,  $\text{K}_3\text{Fe}(\text{CN})_6$  1.9 Gm.,  $\text{Na}_2\text{S}_2\text{O}_3$  1.5 Gm.,  $\text{Na}_2\text{CO}_3$  240 Gm.,  $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$  240 Gm., water to make 1 litre. The carbonate and citrate are dissolved in 700 c.c. of water and filtered. The  $\text{CuSO}_4$  is dissolved in 75 c.c. of water and stirred into the other solution. The ferricyanide and thiosulphate are dissolved separately in 30 c.c. of water each and added to the whole. The urine is diluted so as to contain 0.5 per cent. glucose or less and run from a burette into a test tube containing 10 c.c. of water, 3 c.c. of the reagent and a piece of pumice. The reagent is kept boiling during the titration, the urine being added a few drops at a time at intervals of 1 minute. At the end point the reagent becomes turbid and its whole volume is filled with a bulky precipitate. One Mgm. of glucose is capable of reducing 1 c.c. of the reagent.

**Urine, Rapid Method for the Estimation of Sugar in.** Otto Mayer. (*Münch. Med. Woch.*, 1917, **64**, 1222, through *J. Chem. Soc.*, 1918, **114**, [II], 85.) A mixture of 10 c.c. of the urine with 10 c.c. of 15 per cent.  $\text{NaOH}$  solution is diluted to 50 c.c. with water, and a 2.5 per cent. solution of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  gradually added, with shaking, until the precipitate has almost entirely redissolved and a just perceptible permanent turbidity remains, which increases somewhat on keeping. Under these conditions, each c.c. of the  $\text{CuSO}_4$  is equivalent to 0.1 per cent. of dextrose. If the urine contains more than 4 per cent. of dextrose, only 5 c.c. should be used, whilst if less than 0.5–1 per cent. is present, 20 c.c. should be taken. Should the urine give a precipitate of  $\text{Ca}_2\text{HPO}_4$ , it should be previously treated with a measured proportion of  $\text{NaOH}$  solution, and a suitable fraction of the filtrate submitted to the above titration. Very turbid urines should be filtered, and excessive quantities of

albumin removed by boiling. (See also *Y.B.*, 1915, 43 ; 1916, 73, 74 ; 1917, 43.)

**Urine Reaction in Infants.** M. Fla mini. (*Revista Clin. Pediatrica*, 1917, 15, 462, through *J. Amer. Assoc.*, 1917, 69, 1571.) The author tabulates the findings in 15 breast-fed and 15 bottle-fed infants with the urine reaction and the aspect of the stools. Infants in either group with bowel trouble always had strongly acid urine, with acid phosphates in excess. In healthy breast-fed infants the acidity of the urine ranged from 0.1 to 0.6 ; in the healthy bottle-fed the range was 1.25 to 4.0 except in two cases, in which it was 0.6. In some of the bottle-fed with bowel trouble the acidity reached 5.8. The phosphate content was much higher in the bottle-fed ; when these were given calcium lactate the acidity dropped from 2.0 to 1.3, from 3.5 to 0.9, and from 4.0 to 1.4. The infants took without disturbance up to 0.5 Gm. of calcium lactate at each feeding.

**Urine, Resorcinol as Reagent for Albumin in.** A. Edelmann. (*Wien. klin. Wochschr.*, 29, 901, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2093.) Resorcinol is used as a protein reagent. A little resorcinol is dissolved in ordinary water. In presence of albumin a white ring is formed, and on shaking the urine with the solution an intense cloudiness is noted. The test is more sensitive than that with  $K_4FeCy_6$ . It is not interfered with by other pathological constituents.

**Urine, Simple New Reaction for Bile Pigments in.** J. Kallos. (*Deut. med. Woch.*, 1917, 46, 751, through *J. Chem. Soc.*, 1917, 112, [2], 555.) The urine 5-8 c.c. is shaken with dilute HCl, 1-2 c.c. and 2-3 drops of  $KNO_2$  or  $NaNO_2$  (0.5 per cent.) are added ; a pale to olive-green coloration is developed according to the quantity of bile pigment present. (See also *Y.B.*, 1911, 51 ; 1912, 65 ; 1913, 61 ; 1914, 36.)

**Water, Concentration of Bacteria in Examination of.** F. Dièner t and A. Guiller d. (*Comptes rend.*, 1918, 166, 307.)  $Al_2(OH)_6$  may be used for concentrating the bacteria contained in waters, so that the organisms are obtained in a small bulk. The  $Al_2(OH)_6$  is prepared by precipitating  $Al_2(SO_4)_3$  solution with  $AmOH$  ; the precipitate is washed with hot water and sterilized. The quantity obtained from 8 c.c. of a 10 per cent.  $Al_2(SO_4)_3$  solution is sufficient for the treatment of 1 litre of water. The hydroxide is well mixed with the water, allowed

to settle for 4 or 5 hours, the clear solution is then siphoned off, and the deposit, or portions of it, used for the requisite cultures.

**Water, Detection and Determination of Pb in.** R. M e l d r u m. (*Chem. News*, 1918, **117**, 49.) The following practical details are given for the detection and determination of Pb in drinking water by means of the  $H_2S$  method. *Standard Pb Solutions.* The strong standard is best prepared by dissolving 1.831 Gm. of pure  $Pb(C_2H_3O_2)_2 \cdot 3H_2O$  in 100 c.c. of distilled water, adding a few drops of  $HC_2H_3O_2$ , filtering into a 100 c.c. flask and washing the filter to complete the volume to 100 c.c. This will contain approximately 0.001 Gm. Pb in 1 c.c. It is standardized to exact Pb content by gravimetric determination of the Pb as  $PbSO_4$ . From this strong standard solution, a weaker solution, 1 c.c. = 0.00001 Pb is prepared by dilution. The standards must be kept in Pb-free glass bottles. If any cloudiness appears, a few drops of  $HC_2H_3O_2$  should remove this. If it does not, the solution should be rejected. The solutions should not be poured from the bottles when used, but withdrawn by means of graduated tube pipettes, since Pb tends to be concentrated on the lip or stopper of the bottle. The  $H_2S$  solution used must be freshly prepared. The sample of water to be tested is well shaken and examined for suspended matter, since Pb, when present, often occurs suspended. One hundred c.c. is drawn off, acidified with 1 c.c. of  $HC_2H_3O_2$  20 per cent. and placed in a 100 c.c. graduated cylinder, well mixed and put aside for 2 minutes. 1 c.c.  $H_2S$  is added and again well mixed. This is compared with another 100 c.c. of the sample or distilled water without any reagents being added. The least trace of coloration will indicate the presence of either Cu or Pb. The presence of Cu is detected by testing another portion of the sample with  $AmOH$ , and if present the Pb must be identified and estimated by the  $K_2CrO_4$  method. Zn in  $HC_2H_3O_2$ , being also precipitated by  $H_2S$ , will cause a turbidity when present to the extent of 1 in 100,000. The Zn, therefore, only becomes troublesome by obscuring the brightness of the  $PbS$  coloration. Should this obscurity persist by the presence of Zn the Pb will require to be estimated by the  $K_2CrO_4$  method. However, by adding only 1 c.c.  $H_2S$  or 0.75 c.c. no turbidity will result from Zn, even when present to the extent of 1 in 100,000. The Pb is estimated by comparing the intensity of coloration with a sample of the same water but free from lead, to which is added

lead standard solution to produce equal intensity of coloration. The most convenient and reliable way to do this is to take 100 c.c. of the sample, add acid and  $\text{H}_2\text{S}$ , and compare with 100 c.c. of the Pb free sample, to which is added 1 c.c. acid, and lead solution till equally approximate tints are obtained. Then take a fresh 100 c.c. and add to this the c.c. lead solution found as above, add acid and  $\text{H}_2\text{S}$ , and compare. A slight difference in tint should only result, which may be reduced to equality in colouring by lowering one cylinder or the other, and the respective values found. During the final coloration measurement both columns of liquid ought to be as near as possible of the same height, otherwise low or high results will ensue. The tint estimations are made in a good white light. The test cylinders are covered with two or three folds of stout blotting paper, which are fixed with rubber bands, leaving the bottom uncovered. By using these paper jackets, brighter, stronger, and purer tints are obtained, which are essential for making a true colour comparison. The paper jackets ought to be continued above the 100 c.c. mark. The glasses are placed on the white tile and during colour comparison are raised about one or two inches, with the light adjusted to fall on the plate, and the candle-power increased according as the depth of tint increases. Under these conditions, 1 part Pb per 4 million parts may be detected and estimated with a 7-inch or 100 c.c. column. This is equal to 0.025 part per 100,000 or 0.0175 grain Pb per gallon, which is the limit of the test. With 200 c.c. or 14 inch columns 1 part Pb in 8 million parts may be detected, or 0.0125 part per 100,000, or 0.0067 grain per gallon, which is more sensitive than the chromate test. When the Pb present exceeds 0.75 part per 100,000, on looking down the tube a semi-black reflecting surface only is visible, which is almost opaque to ordinary daylight. At this and greater Pb concentrations vertical colour comparisons cannot be made with the full 100 c.c. column. In such cases it is advisable to work with 50, 40, or 25 c.c. columns, measuring on a vertical line of sight, or better still, to measure the tint on a horizontal line of sight right through the tube. In these cases the paper jackets must be dispensed with. Even when the Pb is present at the rate of 5 parts per 100,000 the horizontal method may be used, but using carbon estimation tubes in place of the cylinders. By this means the estimations may be conducted without resorting to dilution of the sample.



Due to the colouring matter in the water sample, and also its saline constituents and other unknown factors, no estimation of Pb in water by the  $H_2S$  process can be considered satisfactory unless a sample of the lead-free sample water is used as standard. As previously stated, the reason of this is that different waters with the same Pb contents give with  $H_2S$  variable intensity of tint, amounting in some cases to 100 per cent. When distilled water is used for the standard, the lead is likely to be underestimated by 25 to 33 per cent. at least, if not more.

The original sample must be examined for colouring matter against distilled water. The colouring matter present may usually be estimated as compared with c.c. Pb solution in distilled water required to match it. The c.c. lead solution used to produce equality of tint is deducted from the total c.c. lead solution required in the Pb estimation. This will only be necessary when the water colour is high and distilled water used for the standard. In some cases it is not possible to match the natural colour of the water by this means, and other substances such as caramel solution or peat extract used instead. It is essential to test the glass bottle containing the original water for lead. This can only be done by emptying the contents and washing well with a bottle brush, and finally cleaning with a 1 per cent. solution of  $HC_2H_3O_2$  and well washing with distilled water. Fill the bottle with 500 c.c. distilled and 10 c.c. strong  $HC_2H_3O_2$  and allow to stand 24 hours and test for Pb. When the bottle cannot be emptied in this way the test may be made by cleaning the outside and immersing the base in a basin with the acidulated water and performing the test. The application of this test is imperative when the nature of the glass is unknown. It is essential, more especially with new apparatus, to test it and the reagents for Pb.

**Water, Detection of Nitrites in.** — ESCAICH. (*J. Pharm. Chim.*, 1918, **17**, 395.) To 2 c.c. of a 1 : 10 solution of phenazone add 15 c.c. of the water and 4 drops of Denigès' reagent (acid  $HgSO_4$ ). To this mixture, which may or may not have a green colour, add a drop of a 1 : 20 solution of  $K_6Fe_3(Cy_{12})$  and again agitate. In presence of nitrites a red colour will develop, evident with 0.15 to 0.1 Mgm. of nitrites in the litre of water. The reaction is specific. It may be used to detect nitrates after reduction, which may be accomplished by immersing in the water

for an hour a strand of Al wire amalgamated by immersion for 10 minutes in a solution of  $\text{HgCy}_2$ .

**Water, Determination of Zn in.** R. Meldrum. (*Chem. News*, 1917, **116**, 271.) Three graduated 100 c.c. cylinders or Nessler's tubes are stood on a black surface near a window, the first being filled with tap-water only, the second with distilled water, and the third with sample. To No. 1, No. 2, and No. 3 is added 1 c.c. strong  $\text{HCl}$ , and well mixed. To No. 2 is now added 1 c.c. standard Zn solution containing 1 Gm. per litre of Zn, and again well mixed. There is now added 2 c.c.  $\text{NH}_4\text{HS}$  to all the tubes, and again well mixed, and allowed to remain at rest for 15 minutes. At the end of this time a distinct but faint cloudiness or opalescence will have developed in the standard tube, the presence of which will be made evident by comparison with tube No. 1 which contains no zinc. If by this time no cloudiness appears in the sample tube it may be safely inferred that no Zn is present to the extent of 1 in 100,000. If present in the sample to this amount or more, the estimation is made by adding more standard solution of Zn to the standard tube until equal opacities or cloudiness is obtained. For this purpose the standard zinc solution diluted ten times is a convenient strength to use, or containing 0.0001 Gm. Zn per c.c. It is more certain to view the opacity in a horizontal line of vision several feet away from the tubes at an angle of 20 to 30°. By repeatedly changing the line of sight from left to right, and at greater and less distances, differences or equality of opacity may be better observed. Unless the above instructions are rigidly carried out in detail failure to detect and estimate the metal accurately is sure to result. The more essential point is to add sufficient  $\text{HCl}$  to the sample to more than neutralize the alkaline salts present, which in the majority of cases will not require more than 1 c.c.; then, again, sufficient alkaline  $\text{NH}_4\text{HS}$  must be further added to neutralize the free acid and to leave a surplus over to combine with the zinc, which, in the majority of cases, will not require more than 2 c.c. The presence of Mn, Fe, Pb, Cu and Al will of course interfere seriously with the value of the process, that the zinc cannot be identified or estimated.

In the presence of Fe and Al the most convenient method is to acidify 200 c.c. of the water with 1 c.c. strong  $\text{HCl}$ , or more if required, and evaporate to 80 c.c., and add 1 c.c. strong

ammonia, and filter off the  $\text{Fe}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  through a very small ashless filter-paper. Allow to cool, and make up to 100 c.c., and add 2 c.c.  $\text{NH}_4\text{HS}$ , the resulting opalescence being compared with the standard opalescence. As the precipitated  $\text{Fe}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  carries down more or less Zn it is necessary to redissolve this in 5 c.c. weak HCl, and wash with 4 to 5 c.c. water, and reprecipitate, filter, and wash. The filtrate need not exceed 10 c.c. if the iron and alumina is small. This may be added to bulk previous to making up to 100 c.c. (See also *Y.B.*, 1917, 49.)

## COLOURING MATTERS

**Archil Extract, Manufacture of, in the United States.** T. H. Norton. (*Chem. Eng.*, 1917, 25, 268-70, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 226.) The peninsula of Lower California, especially around Magdalena Bay, is an abundant source of the lichens such as *Roccella peruviana*, which furnishes the dyestuff archil (orchil, orseille). In this region about 100,000 tons of this plant are ready for harvesting. Within 3 or 4 years after a tract has been picked clean, a new crop is ready for collection. The lichen is torn from the trees or bushes upon which it is found, allowed to dry upon the ground a few days and then pressed into bales of 550 to 650 pounds. The colouring matter is extracted by grinding the lichen to a coarse powder and allowing the powder to macerate several weeks in dilute AmOH, with constant stirring. The orsellinic acid which results from this fermentation splits off  $\text{CO}_2$  forming orceinol, which in the presence of  $\text{NH}_3$  changes to orcein  $\text{C}_{26}\text{H}_{24}\text{N}_2\text{O}_7$  and yellowish  $\text{C}_{21}\text{H}_9\text{NO}_5$  along with a colouring matter similar to litmus. The thick paste remaining in the vats forms the simplest commercial article. The paste extracted with water gives reddish violet solutions of varying concentrations, the strongest being thick syrups preferred by many dyers.

**Bixin.** A. Heiduschka and A. Panzer. (*Ber.*, 1917, 50, 546, through *J. Chem. Soc.*, 1917, 112, [1], 408.) The empirical formulae assigned to bixin by van Hasselt, Heiduschka, Riffart, Herzig and Faltis seem to depend on the method by which the pigment is purified. Analyses based on various methods of isolation and crystallization are now discussed, but it appears that most dependence is to be placed on a specimen

which has been purified by acetone in the usual way and then crystallized from ethyl acetate. The analysis and methoxyl and molecular-weight determinations of such a product agree with the formula  $(C_{25}H_{30}O_4)_n$ , which was obtained by Pregl (See also *Y.B.*, 1915, 54.)

### Caramel, Chemistry of ; Nature and Constitution of Caramelan.

Mary Cunningham and C. Doré. (*J. Chem. Soc.*, 1917, 111, 589.) Our present knowledge of caramel is confined practically to the work of Gélis, published in 1858. It was then shown that when sucrose is heated to 180–190° C. three products are formed :

- (1) Caramelan,  $6C_{12}H_{22}O_{11} - 12H_2O = 6C_{15}H_{18}O_9$ .
- (2) Caramelen,  $6C_{12}H_{22}O_{11} - 18H_2O = 2C_{36}H_{48}O_{24}$ .
- (3) Caramelin,  $6C_{12}H_{22}O_{11} - 27H_2O = 3C_{24}H_{26}O_{13}$ .

These are supposed to be formed successively by dehydration and polymerization until in caramelin a colloid of high molecular weight is reached.

Gélis showed that sucrose melted at 160° and if kept at that temperature changed without loss of weight into dextrose and laevulosan,  $C_6H_{10}O_5$ . By raising the temperature to 180–190° C. he obtained the three carbohydrates, caramelan, caramelen, and caramelin in proportions varying with the time of heating and the consequent loss of weight. A loss of 12 per cent. gave mostly caramelan, a loss of 15 per cent. chiefly caramelen, and with a loss of 22 per cent. the product consisted almost entirely of caramelin. These three compounds were separated by extracting the caramelan with 84 per cent. EtOH, in which caramelen and caramelin were insoluble. The caramelen was then removed by extraction with cold water, leaving caramelin, which was soluble only in 60 per cent. alcohol or hot water. *Caramelan*, prepared in this way, is a brown, brittle, bitter solid. It softens at 108° C., is very deliquescent, and very readily soluble in water. The aqueous solution is not precipitated by metallic salts, but  $AgNO_3$  and Fehling's solutions are reduced. When treated with an alcoholic solution of  $Pb2C_2H_3O_2$  a compound,  $C_{12}H_{16}O_8.PbO$ , is precipitated, whilst ammoniacal lead acetate gives  $C_{12}H_{16}O_8.2PbO$ . Similar preparations were obtained with Ba. From analysis of the lead and barium compounds and of caramelan itself, Gélis assigned to it the formula  $C_{12}H_{18}O_9$ . *Caramelen* is described as a brown substance



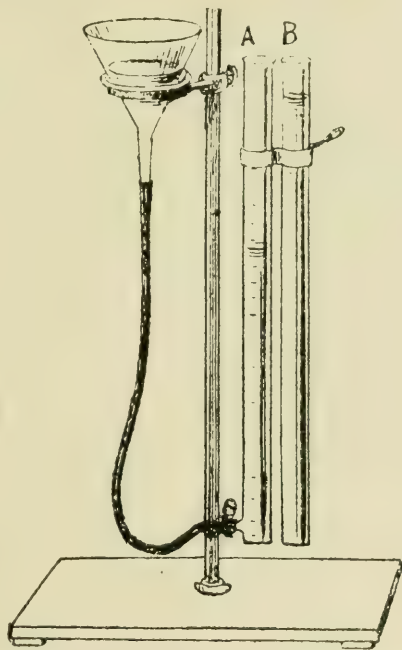
much darker in colour than caramelan and not deliquescent. It reduces Fehling's solution and forms compounds with Pb and Ba similar to those of caramelan. The composition was found to be  $C_{36}H_{48}O_{24}$ . The hot aqueous solution yielded *caramelin*, which is a colloidal substance existing in three modifications, *A*, *B*, and *C*, of which *A* is soluble in cold water, *B* only in boiling water, and *C* insoluble in all ordinary solvents. Caramelin *A* passes into the modification *B* on evaporating its aqueous solution, and can thus be separated from caramelan. All three modifications give the same compound with barium, and have therefore the same composition, namely,  $C_{96}H_{102}O_{51}$ . Caramelin reduces Fehling's solution and is precipitated from solution by almost all metallic salts. It is infusible, very difficult to burn, and much darker in colour than caramelan or caramelan. Graham prepared pure caramelin by dialysing an aqueous solution of caramel, when unchanged sucrose, caramelan, and caramelan passed through the dialyser and caramelin remained behind.

The authors have re-investigated the subject and thus summarize the results of their experiments :

Sucrose, on heating at  $170-180^{\circ}$ , loses 2 mols.  $H_2O$ , forming caramelan,  $C_{12}H_{18}O_9$ , a tetra-atomic alcohol (m.p.  $136^{\circ}C$ .), characterized by the formation of a tetra-acetate (m.p.  $107^{\circ}C$ .), a tetrabenzoate (m.p.  $105^{\circ}C$ .), and a tetranitrate (explosive). It is not possible to decide definitely between the molecular formulae  $C_{12}H_{18}O_9$  or  $C_{24}H_{36}O_{18}$ , but the reactions lend some support to the latter. Compounds formed by caramelan with phenylhydrazine and semicarbazide indicate the existence of one CO- or CHO-grouping per  $C_{24}$  unit, but in each case these are formed with extensive dehydration. Concentrated non-oxidizing acids bring about dehydration to caramelin,  $C_{24}H_{26}O_{13}$ . Weaker solutions hydrolyse and dehydrate, producing dextrose, methylfurfuraldehyde, and humic acid. On oxidation, caramelan tends to yield still more complex substances, and in nearly all cases one carbon atom is removed per  $C_{24}$  unit. With dilute  $HNO_3$ , characteristic nitro-acids are formed. Among simpler products, acetaldehyde has been recognized. Considered together with the products formed by its further dehydration, caramelan seems to mark a first step in the process of anhydride-formation and condensation which leads from simple sugars to such complex substances as cellulose, humus, and caramelin.

**Colorimeter, Practical.** — Moreau. (*Annales des Falsific.*, through *Annales Chim. analyt.* 1917, 22, 185.) This simple instrument consists of two glass calibrated cylindrical twin tubes with flat bottoms. *B* is not graduated, and is the container for the coloured liquid to be tested. *A* is graduated in c.c. and is used for the standard colour solution. It is tubu-

lated at the bottom, and connected by means of rubber tubing with the funnel reservoir on the movable ring. A double clamp joins the two tubes, and a pinch-cock is attached to the lower end of the flexible tubing. This enables the column of colour standard, when needed, to be kept at a constant level. The principle on which it is worked is the varying in the height of this so as to match the depth of colour in the column of liquid, which has a volume of 52 c.c. For "nesslerizing," 50 c.c. of the distillate and 2 c.c. of Nessler's reagent are placed in *B*. A sufficient known volume standard AmCl to give a colour in excess of this, made up to exactly 100 c.c. and treated with 4 c.c. of Nessler's reagent. It is then poured into the funnel and run into



*A* until the column of liquid in *A* matches the colour of that in *B*. The pinch-cock is then closed and the volume of liquid in *A* is read off. The  $\text{NH}_3$  content,  $n$ , of the 52 c.c. of this being known, that of the amount in tube *B* is easily calculated from the formula  $\frac{n \times V}{52}$ . The usual formula used in

colorimetric calculations may be used  $x = T \times \frac{E}{E'}$ , when  $T$  = the strength of the standard solution,  $E$  the height of the column

of the same as read off, and  $E$  the volume of the solution being tested. Since in the above apparatus the tubes are calibrated the formula may be simplified to  $x = T \times \frac{V}{\sqrt[3]{V}}$ . A smaller form of the apparatus, with tubes of 10 c.c. capacity, serves for the colorimetric determination of such samples as need be used in small volume only. A mirror may be employed to throw a beam of light through the column of liquid, or a sheet of white paper placed under the flat bottoms of the tubes.

**Gentisin and the yellow Colouring Matters of *Fraseria carolinensis*.** (*Apoth. Zeit.*, 1916, **31**, 181, 189, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2216.) The statement that the root of *Fraseria carolinensis* contains gentisin is inaccurate. According to Trimble and Lloyd, the root contains two other colouring matters of the composition:  $C_{10}H_{15}O_6$ , of which one forms deep yellow fragile needles m.p. about  $114^{\circ}C$ ., the other bright lemon-yellow fibrous crystals, m.p.  $178^{\circ}C$ . An herbarium specimen of *F. carolinensis* was subjected to a microscopical examination, as was also pure gentisin. *Reactions with pure gentisin*: Pure gentisin consists of very long and slender prisms with smooth terminal surfaces. The longest crystals are faintly curved hither and thither, resembling the fragments of greatly thickened bast fibres. Crystalline aggregates are relatively rare, invariably consisting of prisms distorted along the longitudinal planes. In transmitted light the crystals are pale yellow, not pleochroic, the delicate ones almost colourless; they are optically biaxial, possess total extinction and belong to the rhombic system. Gentisin may be sublimed unchanged on the asbestos plate. At first small obtuse prisms result, followed by fine bent crystalline threads. For recrystallization of the sublimate, EtOH is best suited. Fine sublimate dissolves in hot water and cold EtOH, more readily in MeOH, very quickly in aqueous chloral hydrate solution.  $C_5H_5N$  and  $C_6H_5NH_2$ , likewise in alkalines and strong  $H_2SO_4$  with yellow colour, not, however, in  $ZnCl_2$ , xylene and AcOH. For the further identification of gentisin, alkali salts may be prepared by treating the sublimate formed on the cover glass with 10 per cent. alcoholic KOH or NaOH solution. The resulting dark brown solution after evaporation is treated with  $Et_2O$ , whereupon the salt separates in the form of needles or prisms. On treating the sublimate with a small drop of  $H_2SO_4$  and  $HNO_3$ , at first

numerous small oily drops appear, which soon pass into deep green to blue-green spherical and clustered shapes,  $5-20\mu$  in dimension. After some time similar forms of the chrome-yellow dinitrogen-tisin appear. Sublimates obtained from the drug yield almost exclusively the clustered chrome-yellow dinitrogen-tisin. With  $\text{BrCH}_2\text{CO}_2\text{H}$  (after gentle heat) there is formed very delicate, pale yellow dibromogen-tisin in the form of bushy and clustered needles. Sublimates are better suited to the above reaction than single crystals of gentisin. *Reactions with the gentian plant*: Attempts to detect gentisin within the cells of the drugs were unsuccessful. On subliming single parts of the tissue, however, it could be shown that in the root and rhizome gentisin occurs most plentifully in the outer parts near the phellogen, although the innermost portions of the woody fibre also contain some gentisin. It is absent in the seeds and vegetative parts of *Gentiana lutea*. The flowers of *G. purpureapunctata* contain in large quantity a compound not yet investigated, but melting at  $180^\circ\text{C}$ . and subliming in long colourless prismatic plates. This substance probably belongs to the higher alcohols. • *Frasera carolinensis*: The yellow colouring matters of this plant may be sublimed unchanged directly from the tissues themselves. They occur not only in the root but in much greater quantity in the seed and greenish yellow flower petals; they are not entirely wanting in the green leaves. The content of colouring matter in the corolla must be unusually high. The amorphous sublimates may be crystallized from cold EtOH or MeOH. From EtOH there result (1) long flat prismatic lemon-yellow crystals with pointed ends, (2) very fragile, bent pale-yellow crystalline threads united in aggregates, (3) small orange spheroids. The seed sublimates are immediately crystalline. The crystals of coloring matter are insoluble in water, soluble in cold absolute and 90 per cent. EtOH, slightly soluble in AcOH and  $\text{Et}_2\text{O}$ .  $\text{FeCl}_3$  colours the EtOH solution green, on warming, and also long standing in the air and the addition of  $\text{Na}_2\text{CO}_3$  solution, the green coloration on the edge of cover glass changes into red-brown. KOH and  $\text{H}_2\text{SO}_4$  colour and dissolve to orange. The purest colour results with alcoholic KOH. The colouring matter of *Frasera* with  $\text{H}_2\text{SO}_4 + \text{HNO}_3$  gives a red solution, without forming crystals. From the crystalline form of derivatives obtained by microchemical methods it is considered that three distinct colouring substances are present in *Frasera*.



**Haematoxylon africanum.** A. G. Perkin. (*J. Soc. Dyers and Col.*, 1918, **34**, 99, through *J. Soc. Chem. Ind.*, 1918, **37**, 298A.) A South African species of *Haematoxylon* was discovered in 1909 in Great Namaqualand, and consists of a shrub 1-1.5 metres in height, with yellow flowers and smaller leaves than *H. campeachianum*. Stems 0.5-1.25 in. in diameter consist mainly of a reddish-brown core surrounded by a nearly colourless layer of wood; this core, as in the case of logwood also, darkens on exposure to air. The colour reactions of the extract resemble those of brazilwood rather than those of logwood; it gives a brown with ferric chloride, not a black, and a pale pink precipitate with lead acetate, not a blue. Dyeing trials with *H. africanum* on mordanted wool show colours similar to those obtained with brazilwood, but in all cases duller in shade and poorer in the red constituent. On this account it is of no technical importance. The slight difference in dyeing properties of *H. africanum* and brazilwood may be due to impurities present in the former, but, on the other hand, it might be expected that a methyl ether of haematoxylin would dye shades almost identical in character with those of brazilin itself.

**Hypericum perforatum, Colouring Matter of.** Pauline O'Neill and A. G. Perkin. (*J. Chem. Soc.*, 1918, **113**, 140.) In 1915, Keegan stated that the St. John's wort, *Hypericum perforatum*, contains much flavone, which seemed to be similar to gossypetin. Since this colouring matter is only known to occur in quantity in cotton flowers, the authors have further investigated the colouring matter of *Hypericum*. They find that it is quercetin, and that the plant contains no gossypetin. (See also *Y.B.*, 1915, 57; 1916, 79.)

**Methyl Red as Indicator.** F. Lehmann and G. Wolff. (*Arch. Pharm.*, 1917, **255**, 113-9, through *J. Chem. Soc.*, 1917 **112**, 326-7.) Methyl red (*p*-dimethylaminoazobenzene-*o*-carboxylic acid) has about the same universal value as an indicator for the titration of bases of all strengths that phenolphthalein has for acids. It is more sensitive to H and OH ions than methyl orange. Oxalic and picric acids may be titrated readily with it, and also borates and cyanides, while sulphides do not give sharp end points, and sulphides and carbonates give intermediate orange tones; these should be ignored and the final change to bright pink waited for. The change from red (acid) to yellow (alkaline) is as sharp as the change from

yellow to red, and solutions standardized against phenolphthalein are practically of the same normality with regard to methyl red. The best results are obtained with 2-3 drops of a 1 : 1000 solution in about 100 c.c. of liquid.

**Pigments, New Vegetable, as Indicators in Alkalimetry.** S. Suzuki. (*Taiwan Igakukai Zasshi*, 1917, 174, 276, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 888.) The reddish terminal leaves of *Euphorbia pulcherrima* are crushed in a mortar, and digested with EtOH; the solution is filtered; the reddish brown opaque filtrate is concentrated and absorbed with white filter paper, which is then dried. The dry test paper is light reddish brown; it becomes red with acids, and blue with alkalis, the depth of colour roughly corresponding to the degree of acidity or alkalinity. This indicator is sensitive to 1 : 1000 acid or alkali, in particular to 0.2 per cent. tartaric acid or  $\text{NaHCO}_3$ . The red bamboo, treated in the same manner, yields a transparent emerald-green solution, which becomes crimson with acids and deep blue with alkalis, but is unchanged by neutral compounds; this indicator is even more sensitive than the former.

**Red Sanderswood, Camwood and Barwood, Colouring Matter of.** Pauline O'Neill and A. G. Perkin. (*J. Chem. Soc.*, 1918, 113, 125, 140.) Sanderswood, barwood, caliaturwood, and camwood, are very similar in tinctorial properties. In fact, the first three might well contain the same pigment, but camwood dyes mordanted wool somewhat bluer tones and is more readily extracted by water. A chemical comparison of the camwood pigment with the santalin of sanderwood, recently investigated by Cain and Simonsen (*Y.B.*, 1912, 69), appeared to be desirable. The chief, more insoluble colouring matter of camwood is found to be an isomeride of santalin, designated *isosantalin*. It decomposes at a higher temperature than santalin (250-280°, as against 250-260°) and dyes bluer shades. For many reasons, both pigments are best expressed as  $\text{C}_{22}\text{H}_{18}\text{O}_6(\text{OMe})_2$ , instead of  $\text{C}_{14}\text{H}_{11}\text{O}_4(\text{OMe})$ . Both woods contain more soluble dyes, which are again isomeric. For these, the names *deoxysantalin* and *deoxyisosantalin*, and the formula  $\text{C}_{22}\text{H}_{16}$  or  $\text{C}_{18}\text{O}_5(\text{OMe})_2$ , are proposed. Not much can be said as to the relation between the santalins and the deoxysantalins, except that the results of acetylation do not indicate that the

former possess one more hydroxyl group than the latter. The deoxysantalins are the better pigments.

The first pigment to be isolated from sanderswood was that obtained by Meier (1848), which is apparently deoxysantalins rather than santalin, although the present authors were not so successful in obtaining a crystalline specimen. In 1870, Weidel also obtained from sanderswood, santal, which is now written as  $C_{15}H_9O_5 \cdot OMe$ , and a bright red substance, which is now designated *santalone*, and is possibly deoxysantalins monomethyl ether,  $C_{22}H_{15}O_9(OMe)_5$ . These are difficult to obtain from sanderswood, but they have now been extracted from barwood, which contains santalin as well. Santal crystallizes in large, colourless leaflets, m.p.  $222-223^\circ$ , and yields *santol*, flat needles, m.p.  $270-273^\circ$ , on demethylation by Zeisel's method. Santalone forms glistening, red leaflets, m.p.  $300^\circ$ . The colouring matter in the flower of St. John's wort is quercetin, and not gossypetin, as Keegan suggested. (See also *Y.B.*, 1913, 281; 1914, 144; and *Gen. Index*.)

## ESSENTIAL OILS

**Achillea millefolium, Essential Oil of.** E. R. Miller. (*Bull. Univ. Wis.*, 1916, [785], through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 111, 2135.) The leaves and flower heads of *A. millefolium* yield a blue oil. Most of the oil is obtained from the flower heads, but a very small amount can be got from young plants. Drying the plant material produced no change in either the quantity or quality of oil. The oil contains *l*- $\alpha$ -pinene, *d*- $\alpha$ -pinene, *l*-limonene, *l*-borneol, bornyl acetate and other esters of borneol, *l*-camphor, cineol, salicylic acid, aldehydes, formic acid, acetic, butyric (?), isovaleric acids, at least one non-volatile acid or lactone, and a blue constituent of high b.p.

**Alpinia nutans, Essential Oil of the Leaves of.** K. K a f u k u. (*J. Chem. Ind. Tokyo*, 1917, 20, 349, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2387.) The leaves of *Alpinia nutans* contains 0.053 per cent. of a volatile oil of camphoraceous odour having the following characteristics: Sp.g. 0.9301,  $n_D^{20}$  1.4750,  $\alpha_D + 38.4^\circ$ , saponification value 9.88, acetyl value 36.1. *d*-Camphane, *d*-camphor, and cineol were isolated. Besides these the presence of limonene, sesquiterpene, and a

high boiling phenol is very probable. The essential constituents are camphor (more than 30 per cent.) and camphane (17 per cent.).

**Ammoniacum, Essential Oil of.** F. W. Semmler, K. G. Jonas, and P. Roenisch. (*Berichte*, 1917, **50**, 1823, through *J. Soc. Chem. Ind.*, 1918, **37**, 137A.) The gum-resin of *Dorema ammoniacum* and several species of *Ferula* yields about 0.3 per cent. of oil on distillation. This is found to contain linalyl and citronellyl acetates: a unicyclic, dihydrosesquiterpene, ferulene,  $C_{15}H_{26}$ , closely associated with a bicyclic sesquiterpene,  $C_{15}H_{24}$ , a fraction with b.p.  $124^{\circ}$ – $126^{\circ}$  C. at 7 mm. being a mixture of these in the approximate ratio 3 : 1; an ethylenic, sesquiterpene-ketone, dorenone,  $C_{15}H_{26}O$ , b.p.  $145^{\circ}$ – $155^{\circ}$  C. at 12 mm., amounting to about 22 per cent. of the oil, which may be reduced by means of Pt and H to tetra-hydro-dorenone, or by Na and EtOH to the ethylenic alcohol, doremol, b.p.  $145^{\circ}$ – $150^{\circ}$  C. at 12 mm.; doremol acetate, b.p.  $155^{\circ}$ – $165^{\circ}$  C. at 12 mm.; and cetyl alcohol, in the highest fraction. This is the first recorded instance of the occurrence of cetyl alcohol in a plant, and dorenone is the first example of a sesquiterpene-ketone.

**Aniseed, Cyprian and its Essential Oil.** (*Bull. Imp. Inst.*, 1917, **15**, 300.) Aniseed, *Pimpinella anisum*, fruits from Cyprus grown crops yielded 2.8 per cent. of essential oil, having the sp.g. 0.990 at  $15^{\circ}$  C.  $n_D^{20}$  1.557 solubility in EtOH, 90 per cent., 1 : 2.8; congealing point,  $17.5^{\circ}$  C.

**Artemisia annua, Essential Oil of.** L. Y. Imada. (*Jap. Pharm. J.*, 1917, [420], 119, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2387.) The oil is a bright yellow camphoraceous liquid having the following constants: Sp.g.  $15_4$  0.8984,  $n_D^{15}$   $-16.71^{\circ}$  at  $14^{\circ}$  C.; acid value, 2.1; saponification value, 36.4; acetyl value, 66.36; no  $CH_3O$ . The oil contained cineol. On fractionation, a substance  $C_{10}H_{16}O_2$  was isolated from a lower fraction, boiling between 89–90: this yielded a semicarbazone melting at  $95$ – $96^{\circ}$  C. This substance could not be identified with any known constituent. A higher fraction, boiling between 105–200, contained another substance which gave a crystalline semicarbazone m.p.  $227$ – $229^{\circ}$  C. (See also *Y.B.*, 1905, 43, 44; 1906, 11; 1907, 19; 1908, 23, 24; 1909, 13; 1912, 70; 1914, 46; 1915, 62, 63; 1917, 65; and *Gen. Index*.)



**Artemisia annua Oil, Further Investigation of.** Y. Asahino and E. Yoshitomi. (*Jap. Pharm. J.*, 1917, [424], 1.) The two unidentified ketones having the generic formula  $C_{10}H_{16}O$  isolated by Imada from this oil have been identified. The first proves to be quite new to literature and has been named *Artemisiaketone*. Liberated from its semicarbazone, which melts at  $95-96^{\circ}C.$ , it is a liquid, boiling at  $182^{\circ}C.$ ; sp.g. is 0.8906 at  $14^{\circ}C.$  Both these characters are totally different from those of any ketonic substance hitherto recorded as occurring in essential oils, for these have much higher sp.g. and b.p. Also, on catalytic reduction with Pt black in an atmosphere of H, it formed a tetrahydro compound  $C_{10}H_{20}O$ , b.p.  $173^{\circ}C.$  It must therefore contain two double bonds in the molecule and is an aliphatic ketone. The second ketone isolated by Imada has been identified as laevo-camphor.

**Asparagus sprengeri, Oil from Flowers of.** F. Elze. (*Chem. Zeit.*, 1917, 41, 842, through *J. Soc. Chem. Ind.*, 1918, 37, 106A.) The flowers of *Asparagus sprengeri*, grown for decorative purposes [and popularly known as the Asparagus Fern], when extracted with a solvent yield an oil having a strong aldehydic odour; this oil yields a semicarbazone. If the oil is obtained by subjecting the flowers to steam-distillation, the odour is less intense, steam evidently causes decomposition of some constituent of the oil.

**Blepharocalyx gigantea, Essential Oil of the Leaves of.** F. Zelada. (*An. Soc. quim. Argent.*, 1917, 5, 226, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 1103.) *Blepharocalyx gigantea* is a tree indigenous to subtropical Tucuman. The partially air-dried leaves yield 1.5 per cent. of yellowish fragrant essential oil, the odour of which somewhat resemble that of peppermint or eucalyptus oils. Sp.g. 0.9188 at  $15^{\circ}C.$ ; b.p. 169.9;  $\alpha_D -2^{\circ}22'$ ;  $n_{D_{27}} 1.4732$ ; solubility in EtOH 80 per cent., 1:6:1; practically insoluble in EtOH 70 per cent. The presence of a terpene, a terpene alcohol and esters was established, the ester value being 56 and the acetyl value 172. No phenol, ketone, aldehyde, or free acid were detected.

**Camphor, Determination of, in Soap Liniment and in Spirit of Camphor.** L. F. Kleber and collaborators. (*J. Amer. Pharm. Assoc.*, 1917, 6, 684.) The following is the method employed for the determination of camphor in the two prepara-

tions named in the Bureau of Chemistry, U.S. Department of Agriculture, in the official control of medicines.

*Soap Liniment.*—Make a standard soap liniment and determine the  $a_D$  in a 200 mm. tube at a convenient temperature. The  $a_D$  will be about  $+10.7$  sugar scale in a 200 mm. tube at  $25^\circ\text{C}$ . Determine the  $a_D$  of the sample under consideration at the same temperature. Multiply the  $a_D$  of the sample by 4.5 and divide by the  $a_D$  of the standard. The result will be Gm. of camphor per 100 c.c. of the sample.

*Spirit of Camphor.*—Make a standard solution by dissolving 10 Gm. of dry camphor in enough U.S.P. alcohol to make 100 c.c. Determine the  $a_D$  of the sample and standard in a 200 mm. tube at the same temperature. Multiply the  $a_D$  of the sample by 10 and divide by the  $a_D$  of the standard. The result expresses the number of Gm. of camphor in 10 c.c. of the sample. (See also *Y.B.*, 1917, 62.)

**Cardamom Oil, Mysore.** (*Perfum. Record*, 1918, 9, 31.) A specimen representing a bulk of cardamom oil distilled in Mysore had the following characters: Sp.g. 0.934;  $a_D + 21^\circ$ ;  $n_{D28^\circ}$  1.4015; solubility 1 : 3 in EtOH 70 per cent. The oil has therefore all the characters of that distilled in this country from Malabar cardamoms and differs materially from the oil of wild Ceylon cardamoms both in aroma and solubility. It contains a considerable amount of cineol.

**Citronellals, Two Isomeric.** H. J. Prinz. (*Chem. Weekblad*, 1917, 14, 692, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 473.) The work of Harries and Hemmelmann indicating the existence of two isomeric forms of citronellal is confirmed. The author has separated ordinary citronellal into *w*-citronellal  $\text{CH}_2:\text{CMe}(\text{CH}_2)_3\text{CHMeCH}_2\text{CHO}$  and its more symmetrical isomer  $\text{CMe}_2\text{C}:\text{CHCH}_3\text{CH}_2\text{CHMeCH}_2\text{CHO}$ . The former has the b.p.  $203\text{--}204^\circ\text{C}$ .;  $n_{D16^\circ}$  1.45882; sp.g. 0.8880 at  $14^\circ\text{C}$ .; its semicarbazone melts at  $85\text{--}86^\circ$ . The latter boils at  $198\text{--}9^\circ\text{C}$ .;  $n_{D16^\circ}$  1.45742; sp.g. 0.8745 at  $14^\circ$ ; the semicarbazone melts at  $83\text{--}84^\circ\text{C}$ .

**Cnidium officinale, Essential Oil of.** K. Sakei. (*Japanese Medical Literature*, 1916, 1 (Part 2), 10, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2386.) Native practitioners of China, Japan, and Korea use the roots of this plant extensively for various nervous diseases and for female disorders. The

active principle is a volatile oil, which is present to the extent of about 0.82 per cent. The oil is yellowish brown, with a peculiar odour and a bitter taste, has a sp.g. of about 1.030 to 1.040, is levorotatory, insoluble in water and soluble in EtOH. It contains an unsaturated acid,  $C_{12}H_{19}O_3$ , an alcohol,  $C_{10}H_{18}O_3$ , and a compound with the formula  $C_{12}H_{18}O_2$  (probably a lactone). The chief action of the oil is to stimulate the vaso-constrictors and raise the blood pressure; it stimulates the central nervous system, and increases the reflexes by reason of spinal irritation; it apparently has no action on the kidneys; in large doses, the acid produces hemolysis.

**Coriander Seed, Cyprian, and its Essential Oil.** (*Bull. Imp. Inst.*, 1917, 15, 301.) Corianders grown in Cyprus yielded 0.48 per cent. of essential oil, having the sp.g. 0.879 at 15° C.;  $n_D^{20} + 12^\circ 20'$ ;  $n_{D20}^{20}C$ . 1.467; soluble in EtOH 70 per cent. 1:1.9 and more.

**Coumarin, Adulterated.** (*Perfum. Record*, 1918, 9, 81.) The high price now ruling for coumarin necessitates careful examination of purchases. A sample has been recently met with containing at least 30 per cent. of terpin hydrate. The presence of this adulterant may be proved by extracting with Et<sub>2</sub>O, in which terpin hydrate is much less soluble than coumarin. The m.p. of the residual portion will be found to be much higher than that of coumarin. The latter melts at 67° C., and terpin hydrate at 116–117° C. A mixture of the two melts at 102–105° C. On heating terpin hydrate with dilute H<sub>2</sub>SO<sub>4</sub> the characteristic odour of terpineol will be recognized.

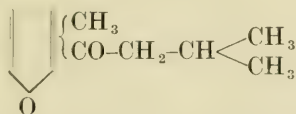
**Crithmum maritimum from different Parts of France, Essential Oil of.** M. Delépine and G. de Belsunce. (*Bull. Soc. Chim.*, 1918, 23, 24, through *Journ. Soc. Chem. Ind.*, 1918, 37, 137A.) Oil of samphire obtained from plants grown in different parts of France always contained the three characteristic constituents, 5-6-dimethoxy-3-4-methylenedioxy-1-allylbenzene, the methyl ether of thymol, and crithmene. Samples from different sources differed considerably, however, in the relative amounts of these three constituents present, and some of the oils contained in addition *p*-cymene, *d*-pinene, and a paraffin, m.p. 63° C. (See also *Y.B.*, 1913, 76.)

**Darwinia grandiflora, Essential Oil of.** R. T. Baker and H. G. Smith. (*J. Proc. Roy. Soc. N.S. Wales*, 1917, 50, II,

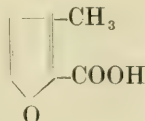
181-6.) The leaves and terminal branchlets of *D. grandiflora*, a new species, gave 0.12 per cent. of a red mobile essential oil with a terpene-like odour. The crude oil had the sp.g. 0.9150,  $a_D + 23.1^\circ$ ,  $n_{20}$  1.4773, solubility more than 1 : 10 80 per cent. alcohol. Saponification number 3.7; as butyric acid was detected it is possible that the ester is a butyrate. On fractionating the oil, the fraction b.p. 156–60° C. had a pinene-like odour and the sp.g. 0.872,  $a_D + 41.6^\circ$ ,  $n_{20}$  1.4685. The purified nitrosochloride prepared from it melted at 104°. (See also *Y.B.*, 1917, 65.)

**Dill Oil, English.** (*Perfum. Record*, 1917, 8, 349.) This season's oil is remarkable for its low sp.g., high  $a_D$  and low carvone content. Oils examined have had the following characters: Sp.g. 0.895 to 0.897;  $a_D + 83^\circ$  to  $+ 88^\circ$ ;  $n_D$  1.481 to 1.483; carvone 40 to 44 per cent. Some of these figures are outside the limits given in the B.P., 1914. The oil distilled in England varies from season to season. The fruits do not all ripen at the same time, and the herb is generally cut and stacked for the fruits to ripen before they are separated for the distillation of the essential oil. The carvone content of the oil obtained from herb grown in hot summers is usually higher than that produced in cold or wet seasons. (See also *Y.B.*, 1904, 18; 1910, 69, 70, 77, 78, 386; and *Gen. Index*.)

**Elsholtzia Cristata Oil, Constitution of Elsholtzie Acid from.** Y. Asahina and T. Kariyoni. (*Jap. P.S.*, 1918, [491], 1.) In 114 (*Y.B.*, 1915, 72) Asahina and Murayama isolated elsholtzia-ketone from this oil. Subsequent investigation showed that this had the structure



and that when treated with amyl nitrite and Na it yielded elsholtzie acid,  $\text{C}_6\text{H}_6\text{O}_3$  (*Y.B.*, 1915, 72.) This is now proved to be furane- $\alpha$ - $\beta$ -dicarboxylic acid





**Essential Oils from Plants cultivated on the South Crimean Coast.** E. V. Voulf, G. V. Pigoulevskii and E. A. Albrecht. (*Bot. Lab. and Garden of Nikitskii Imp. Garden*, 1916, [3], 41, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 739.) The cultural methods followed in the case of: (a) *Rosmarinus officinalis*, (b) *Laurus nobilis*, (c) *Salvia grandiflora*, (d) *Lavandula spica*, and (e) *Hyssopus officinalis*, are described. The yield in essential oils was found to be for (a) 0.80 per cent., (b) 0.55 per cent., (c) 0.29 per cent., (d) 1.26 per cent., and (e) 0.47 per cent. Considering that the normal content in essential oils is 1.4–2 per cent. for (a), 0.4 per cent. for (c), and 0.8 per cent. for (d), it is considered probable that better results would be obtained if the cultivation of these plants were improved, more especially as the distillations were carried out by a primitive method and that the actual yield in the oils studied is probably superior to that found. The chemical composition of the oils differed little from oils from other geographical sources, though they showed some peculiar characteristics.

**Essential Oils, General Method for Detection of Phenols in.** L. Gugliamelli. (*Anales soc. quim. Argentine*, 1917, 5, 11, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 665.) The author's arsenotungstic and arsenotungstomolybdic reagents (see Index) have been applied to the detection and determination of phenols in essential oils. Hydrocarbons and compounds with alcoholic and ether functions failed to give a colour reaction with the reagents. Of the compounds with aldehyde function only furfural and PhCHO gave colour reactions; these two compounds gave a slight blue colour (probably due to impurities) with the arsenotungstomolybdic reagent. Of the typical ketone essential oils only oil of rue (Me nonylketone), camphor, methone and carvone were tested. Oil of rue was the only one which gave a colour reaction; this gave a light indigo blue colour (probably due to impurities) with the arsenotungstomolybdic reagent. The two reagents were found to be very sensitive indicators of the presence of phenols and phenolic amines in essential oils. This fact is of practical value in view of the pronounced influence on the organoleptic properties of certain compounds of phenolic hydroxyl either alone or associated with CHO groups and hydrocarbon chains with double bonds. The two reagents may be used for quantitative colorimetric determination of phenols in essential oils as well as for their detection,

Promising results were obtained in the determination of thymol, eugenol and Me salicylate in oils of thyme, cloves and gaultheria. The reagents react only with free phenol OH; no coloration was obtained with anethol, veratrol, trimethylpyrogallol, etc. The use of the above reagents has the advantage that 1-2 c.c. of an essential oil dissolved in 10 c.c. alcohol is sufficient for the examination, while the entire operation does not require more than 10 minutes. The intensity of coloration is proportional to the concentration of phenol.

**Essential Oils, New Formula for calculating Results in the Determination of Alcohols by the Acetylation Method.** T. T. C o c k i n g. (*Perfum. Record*, 1918, 9, 37.) The formula originally employed and officially adopted in the B.P. 1914 has been shown by Parry to be correct only when no esters are present. In the presence of an appreciable amount of esters the error in the calculated result becomes considerable. The author has now constructed a formula by means of which the amount of a free alcohol may be determined in the presence of any esters which are unaffected by acetylation.

The data required are :—

saponification value of original oil =  $a$

saponification value of original oil after acetylation (not acetylation of saponified oil) =  $b$

molecular weight of alcohol (if monatomic) =  $y$

The formula is constructed in the following manner :—

Let  $x$  = weight gained by 1 Gm. of oil on acetylating. This is due to addition of  $\text{CH}_3\text{COOH}$  and elimination of  $\text{H}_2\text{O}$ —a net increase of " $\text{C}_2\text{H}_2\text{O}$ ," with a molecular weight increase of 42.016.

Thus 1 Gm. of original oil with saponification value  $a$  adds on  $x$  Gm. " $\text{C}_2\text{H}_2\text{O}$ ," with saponification value 1335.5,\* becoming  $(1 + x)$  Gm. of acetylated oil with saponification value  $b$ ,

$$\text{i.e. } a + 1335.5x = (1 + x)b,$$

from which

$$x = \frac{b - a}{1335.5 - b}.$$

Now  $x$  is molecularly proportional to the alcohol present and the weight of the latter will therefore be

\* 1335.5 is the saponification or neutralization value of  $\text{CH}_3\text{COOH}$  minus  $\text{H}_2\text{O}$ , calculated on international atomic weights.

$$\frac{xy}{(42.016)}$$

$$\text{and per cent. free alcohol} = \frac{(b-a)y}{0.42016(1335.5-b)}.$$

The following table shows the figures obtained in actual determinations by using the above formula, compared with those given by the old formula. It will be noticed that the greatest error—110 per cent.—occurs on No. 7, where the ester is high but the free alcohol low.

	Substance.	Per cent. Esters=	Per cent. Combined Alcohol.	Per cent. Total Alcohols (Calculated from Old Formula).	Per cent. Free Alcohol by Difference.	Per cent. Free Alcohol (Calculated on New Corrected Formula).	Error in Old Formula Calculated as Percentage on Free Alcohols Present.
1	Rosemary Oil	5.26 (bornyl acetate)	4.13	16.52	12.39	12.09	+ 2.48
2	Peppermint Oil, American	8.46 (menthyl acetate)	6.67	61.08	54.41	53.3	+ 2.08
3	Peppermint Oil, Mitcham	10.6 (menthyl acetate)	8.35	74.5	66.15	64.47	+ 2.60
4	Geranium Oil, Palmarosa	9.19 (geranyl acetate)	7.22	90.26	83.04	81.24	+ 2.21
5	Geranium Oil, African	28.1 (geranyl tiglate)	18.34	77.31	58.97	52.65	+ 12.01
6	Validol . .	50.95 (menthyl valerate)	33.1	75.3	42.2	35.92	+ 17.48
7	Menthyl Valerate	55.35	35.98	44.34	8.36	3.98	+ 110.0
8	„ „ a	31.77	20.66	67.46	46.8	43.03	+ 8.76
9	„ „ c	44.67	29.04	47.45	18.41	14.7	+ 25.24

**Essential Oils of Spike Lavender, Rosemary and Geranium from British East Africa.** (*Perfum. Record*, 1917, 8, 263.) Specimens of these oils distilled at Limoru, British East Africa, by W. E. D. Knight, from plants grown on the spot have been examined.

*Spike Lavender Oil.*—This had the sp.g. 0.894;  $n_D^{20}$  — 10° 30'; esters 3 per cent.; alcohols 44.1 per cent. The oil was very fragrant and of high quality. The alcohol content is very high, the highest previously recorded being 41.4 per cent. If the oil can be produced in quantity it will prove of considerable commercial value.

**Rosemary Oil.**—This had the sp.g. 0.908;  $a_D + 1^\circ$ ; esters 4.2 per cent.; alcohols 15 per cent. The quality of the oil compared favourably with the best French products. Its ester content is very high. In the best French and Spanish oils this does not exceed 3.6 per cent. and the majority are but a little above the U.S.P. limit of 2.5 per cent.

**Geranium Oil.**—This contained 12.1 per cent. of esters and had a not very pleasant odour, suggesting that of laudanum. This is a characteristic of the oil of *Pelargonium radula* var. *quercifolium*. It is possible that it was distilled from old plants. The results obtained with the first two oils are very satisfactory, and indicate the desirability of cultivation trials in this region with other crops producing essential oils.

**Essential Oils, Production of, in U.S.A.** W. W. Stockberger. (*Amer. Perfum.*, 1918, 13, 8.) An interesting article, illustrated with photographs, description of the experimental work of the Bureau of Plant Industry of the U.S. Department of Agriculture, on the cultivation and distillation of plants producing essential oils. The illustrations include that of an experimental field still, and of growing crops of rose geranium, lemon grass and ginger lily, *Hedychium coronarium*. The last named is a Scitamineous plant the flowers of which are very fragrant and suggest the odour of gardenia or tuberose. It may prove of value in perfumery.

**Eucalyptus Macarthuri Bark, Essential Oil of.** H. G. Smith. (*J. proc. Royal Soc. N.S.W.*, 1916, 50, [H], 177.) The bark of this tree yields an oil similar in all characters and constituents with that obtained from the leaves. It may therefore be used as a commercial source of the oil. It is, similar to the leaf oil, very rich in geranyl acetate and contains free geraniol as well. The yield from the bark distilled in November was 0.12 per cent. (See also *Y.B.*, 1917, 65.)

**Eucalyptus platypus, Essential Oil of.** J. C. Earl. (*Proc. Royal Soc. Vict.*, 154-6.) Distillation of the fresh leaves gave about 1 per cent. of oil, sp.g. 0.9045,  $a_{D12} + 9.1^\circ$ ,  $n_{D20}$  1.4675 saponification value 6, acetyl value 24, cineol by direct absorption with resorcinol 59 per cent.; no aldehydes nor ketones were present. The constituents of the oil were: Pinene 20-5 phellandrene 10-15, cineol 55-60, aromadendrene 10-15, and alcohols, free and combined as esters, 5 per cent.



**Eugenia Smithii, Essential Oil of.** A. E. Dawkins. (*Proc. Roy. Soc. Victoria*, 1915, [1], 149, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2715.) The oil distilled from the leaves was of a pale yellow colour and possessed a sweet, penetrating odour. The following data were determined in May: Yield, 0.44 per cent., sp.g. 0.866,  $a_{15} + 35^\circ$ ,  $n_{D20}$  1.4701. In July the figures were: Yield, 0.28 per cent. sp. g. 0.863,  $a_D + 34.6^\circ$ ,  $n_D$  1.4675. The results indicate a slight seasonal variation. The composition of the oil is *d*- $\alpha$ -pinene 80-90, esters 4, and alcohols 3.7 per cent.

**Frenela rhomboidea, cultivated in India, Essential Oil from Leaves of.** P. Singh. (*Perfum. Record*, 1917, 8, 304.) The Oyster Bay Pine, *Frenela rhomboidea*, indigenous to Australia, has been cultivated in the Nilgiris since 1885. At present there are about 130 acres cropped with this. The green leaves gave 0.039 per cent. when distilled in November, practically the same as the yield obtained in distillations in Australia. The Indian distilled oil had the following characters: Sp.g. 0.8710 at  $16^\circ$  C.;  $a_D - 27.6$ ;  $n_{D18}$  1.4695; ester value 52.3; acetyl value 59.81; free alcohols, calculated as geraniol, 2.08 per cent.; total alcohols, 17.28 per cent.; esters as geranyl acetate, 17.85 per cent.; solubility in EtOH 90 per cent. 1:0.75, in EtOH 80 per cent. 1:21.5. The Australian distilled oil differed slightly from these characters and is stated to have contained 30.43 per cent. of geranyl acetate. Besides the above constituents, the oil is said to contain laevopinene, limonene, and dipentene.

**Indian Essential Oils; Eucalyptus, Geranium and Wintergreen.** P. Singh. (*Perfum. Record*, 1917, 8, 326.) *Eucalyptus Oil*.—At the present time about 24,000 lb. of *Eucalyptus Globulus* oil is distilled in the Nilgiris, mostly by the local growers. This is disposed of mainly to the Government, and is all consumed in India. This oil is very uniform in composition and has the following characters: Sp.g. at  $19^\circ$  C., 0.9065 to 0.9155;  $a_D + 5$   $27'36''$  to  $+ 9'39'23''$ ;  $n_D$  1.463 to 1.466; acid value, 0.18 to 0.104; saponification value, 8.90 to 20; acetyl value, 17 to 21.68. Cineol content, 60 per cent. by volume.

*Geranium Oil*.—Wild geraniums occur in profusion in the Nilgiris. An experimental distillation of one of these, *Pelargonium graveolens*, failed to yield a satisfactory result. An experimental crop of Algerian geranium cultivated in the Nil-

giris was distilled when the flowers had all expanded and the plants were turning yellow. Under these unfavourable conditions the yield of oil was only 0.04 per cent. This had the following characters: Sp.g. at 16° C., 0.888;  $a_D$  — 5.39°;  $n_D$  at 18° C., 1.460; saponification value, 96.25; acetyl value, 226.08; total geraniol, 74.79 per cent.; combined geraniol, 28.19 per cent.; free geraniol, 46.60 per cent.; esters as geranyl tiglate, 40.12 per cent.

*Wintergreen oil*.—*Gaultheria fragrantissima* occurs in Assam, on the Nilgiris, and in Burma, but until now it has not been used for the distillation of the essential oil. Trial distillations show that the Nilgiri plants are capable of yielding only small quantities of oil, 0.12 per cent., whereas Assam plants 0.65 per cent. on the green material. The oil from the latter had the following characters: Sp.g. at 16° C., 1.185;  $a_D$  + 0°;  $n_D$  at 25° C., 1.4000; saponification value 362.9, equivalent to 99.14 per cent. of methyl salicylate; solubility in EtOH 70 per cent., 1:6. The oil meets the requirements of the B.P. 1914, except that its refractive index is 1.4000 instead of 1.537–1.539 as officially prescribed.

**Japanese Peppermint Oil.** H. Walbaum. (*J. prakt. Chem.*, 1917, **96**, 245, through *J. Soc. Chem. Ind.*, 1918, **36**, 349A.) The fraction of Japanese peppermint oil of b.p. 250°–310° C., sp.g. at 15° C. 0.9490, consists largely of 3-hexen-1-yl phenylacetate  $\text{CH}_2(\text{C}_6\text{H}_5).\text{CO}_2.\text{CH}_2.\text{CH}_2.\text{CH}:\text{CH}.\text{CH}_2.\text{CH}_3$ , which when prepared in a pure condition is a liquid with onion-like odour, b.p. 135°–136° C. at 4 mm., 290° C. at 760 mm.; sp.g. at 15° C. 1.000;  $n_D^{20}$  + 1.49810. Several other synthetic esters of the alcohol are described. The isomeric 2-alcohol has already been detected together with its corresponding aldehyde in the green leaves of numerous plants.

**Lemon Oil, Abnormal Characters of Present Season's Product.** (*Perfum. Record*, 1918, **9**, 106.) The oil of the 1917–1918 crop is distinguished by an exceptionally high rotation. There are very few samples in which the  $a_D$  does not exceed + 60, and the greater number have the  $a_D$  + 62° to 64°. Some specimens as high as 66° are recorded. The citral content is low, falling between 4 to 4.3 per cent., and in some districts as low as 3.6 per cent. Very little oil showing 4.5 per cent. of citral has been produced. (See also *Y.B.*, 1916, 97; 1917, 97.)

**Lemongrass Oil, Formosan, Constituents of.** K. K a f u k u. (*Jap. J. Chem. Ind.*, 1917, **20**, 825, through *J. Soc. Chem. Ind.*, 1918, **37**, 74A.) The terpene isolated from lemongrass oil from Formosa gave, on reduction with Na and EtOH, a derivative corresponding closely with dihydromyrcene, yielding dihydromyrcene tetrabromide, m.p.  $87^{\circ}$ – $88^{\circ}$  C. It was further reduced by H and Pt to 2·6-dimethyloctane. On oxidation with alkaline  $\text{KMnO}_4$  it yielded succinic and oxalic acids. The identification of this terpene with myrcene is considered complete. In addition, the oil contains an aldehydic substance, other than citral, which has not yet been isolated. (See also *Y.B.*, 1906, 46.)

**Lime Oil, Distilled, from Nigeria.** (*Perfum. Record*, 1918, **9**, 31.) The oil distilled at Yaba in Nigeria has an exceptionally fine odour resembling that of the fresh fruit. Sp.g. 0·882;  $\alpha_D + 34^{\circ}$ ;  $n_{D20} 1\cdot4775$ . It is suggested that the preparation of hand-pressed lime oil should be attempted in Nigeria.\*

**Mentha Viridis Oil, Influence of Season, Time of Harvest, Drying and Freezing on.** F. R a b a k. (*Bull. U.S. Bureau of Agriculture*.) A great number of experiments, conducted at the instance of the U.S. Bureau of Agriculture, spread over several successive years, are recorded in tabular form. These demonstrate that oil of spearmint is very sensitive to seasonal conditions, the characters of the distillate in one year showing marked divergences from that of another. The yield also is greater in some seasons than in others. The maximum content of oil is present during the period of flowering, the tops giving the highest percentage. Drying the plants results in a lower yield of oil; but the oil obtained has a higher ester and alcohol content. Esterification and alcohol formation tends to increase in the undried plant as it matures. The highest yield recorded is 0·48 per cent., calculated on the fresh material, from the fresh flowering tops in 1911; in 1910 only 0·14 per cent. was obtained; and the yields from the whole herb were extremely poor in that year. The effects of frost are very striking. The material employed was the second crop, frostbitten in November. The yield of oil from this material, 0·11 per cent., was but little less than that from unfrozen plants, 0·13 per cent. The oil from the frostbitten material was superior in fragrance and in solubility to that obtained from the unfrosted plants. It also had a greatly increased ester and alcohol content, as shown by the following figures, in which the first represents the frosted and the second

the unfrosted oil: Sp.g. 0.9180 at 24°, 0.9252 at 23° C.;  $n_D$ , — 4.7, — 27.5;  $n_{D25^\circ}$  1.4771,  $n_{D23^\circ}$  1.4822; solubility in EtOH 80 per cent., 1:0.5 clear in more; 1:6 turbid in 2; free acids as acetic acid 0.79 per cent., 0.85 per cent.; esters, 25.9 per cent., 8.75 per cent.; alcohols, 19.26 per cent., 12.22 per cent. (See also *Y.B.*, 1907, 103; 1910, 73, 93; 1911, 75; 1912, 87; 1917, 70.)

**Menthol, Crystalline Forms of.** F. E. Wright. (*J. Amer. Chem. Soc.*, 1917, 39, 1515.) Menthol crystallizes in at least 4 forms, of which only the  $\alpha$ -form is stable between 0° and its m.p., 42.5° C. The other 3 forms are monotropic, and melt respectively at 35.5° ( $\beta$ ), 33.5° ( $\gamma$ ), and 31.5° C. ( $\delta$ ). On account of the readiness with which the liquid enters into the state of superfusion, the three monotropic forms are easily obtained. The temperature of crystallization appears to be the chief factor which determines the form of the crystals. The unstable forms are transformed into the  $\alpha$ -form on keeping. All the forms show a tendency towards the development of radial spherulites. These are spherical in the  $\beta$ -,  $\gamma$ - and  $\delta$ - crystals, and ellipsoid with the  $\alpha$ -crystals resulting from the transformation of the other modifications.

**Nigella sativa, Black Cummin Seed, Cyprian and its Essential and Fixed Oils.** (*Bull. Imp. Inst.*, 1917, 15, 304.) The seeds of *Nigella sativa* or black cummin are used as a condiment in the East. They are also known as fennel flower seeds. The seeds grown in Cyprus gave 0.3 per cent. of brownish essential oil with a disagreeable odour. They also gave 44.8 per cent. of dark brown fixed oil. This had the sp.g. 0.8614  $\frac{100^\circ \text{C.}}{15^\circ \text{C.}}$ , titre value 22.3° C., acid value 101.3, saponification value 198, iodine value 123.8, unsaponifiable matter 123.8 per cent.

**Origanum Bevani, Cyprian, and its Essential Oil.** (*Bull. Imp. Inst.*, 1917, 15, 305.) This new species, *Origanum Bevani*, is known in Cyprus as “rikhanon.” From the results of a trial distillation of the dried herb it is concluded that it would not prove a favourable commercial source of Cyprian origanum oil. The plant is sparsely distributed, and yields only about half as much essential oil as *O. dubium*, the usual source. The parcel of *O. Bevani* gave 1.9 per cent. of essential oil, sp.g. 0.951;  $n_D$  + 0° 24';  $n_{D25^\circ}$  1.51; total phenols 75 per cent.; soluble in



EtOH, 70 per cent., 1 : 2.7 at 15° C. The phenols consisted of a mixture of approximately 41 parts of carvacrol and 34 parts of thymol.

**Perfumes from Chinese Plants.** S. C. Loo. (*Perfum. Record*, 1918, 9, 10.) In an interesting communication on Chinese flowers esteemed for their fragrance, it is suggested that the following might prove of value as the sources of essential oils or perfumes. *Olea fragrans*, "Kwe Hwa." This shrub is cultivated throughout China on account of the fragrance of its flowers which appear in the autumn in clusters similar to the lilac bloom. The dried flowers are employed to increase the aroma of tea. The fragrance of the fresh flowers is very powerful, somewhat resembling that of jasmin. *Cymbidium ensifolium*, "Lan Hwa," has extremely fragrant blooms resembling lily-of-the-valley in odour. *Prunus nume*, "Mei Hwa," a winter flowering shrub, bears blooms of great fragrance. *Camellia sessaanqua*, "Cha Hwa." This also is used when dried to impart fragrance to tea; the flowers are also often added to tea infusion itself to increase the flavour. *Chloranthus inconspicus*, "Chu Lan Hwa." The flowers are used for decorative purposes and for perfuming tea. It is probable that useful essential oils might be obtained from the following fruits: *Citrus chirocarpa*, "Foo Show" or "Buddha's hand." Cultivated solely for its fragrance, since it is not edible, which recalls that of orange flowers. *Citrus chinensis*, "Kum Quat," or golden tangerine, a delicious edible fruit resembling an olive in shape but with a reddish skin. *Eriobotrya japonica*, "Loquat" or "Pee pa." This produces fragrant white flowers in winter; the fruits ripen in April, and are orange in colour. The single large brown seed has a pleasant almond-like aroma, and yields an oil used for flavouring purpose. *Diospyros kaki*, Sze Tze or Chinese persimmon. The red fruit resembles a tomato and is not edible until dead ripe; before that it is very astringent; it is therefore bletted similar to medlars. *Nephelium lichi*. The Leechee is limited to Southern China, where it blooms in April, bearing fragrant white flowers. The fruit has a red shell enclosing a white, very juicy pulp which rapidly loses its delicious flavour. It is tinned for commercial transport, but when so treated does not retain its characteristic flavour.

**Perfumes, Power of, and their Solubility in Water and in Oil.**  
E. L. B a c k m a n. (*J. Physiol. Path. gén.*, 1917, 17, 1, through

*J. Chem. Soc.*, 1918, 114, [1], 88.) In order that a substance may be odorous, it must be sufficiently soluble both in water and in lipoids, since the cells of the receptor organ for smell are covered with a watery fluid, whilst they themselves contain lipid granules. Thus, the odours of the series of homologous alcohols first increase as the molecular weight rises, and then decrease again. The lower members are comparatively odourless because only sparingly soluble in fats; cetyl alcohol, because it is almost insoluble in water. Butyl alcohol, soluble in water and fats, has a powerful odour. The same applies to benzene, toluene, xylene, and *p*-cumene, and to isomeric butyl and amyl alcohols; also to the three nitrophenols and nitrotoluidines, to the dimethyltoluidines, bromoanilines, and naphthylamines. The changed solubility in water and in oil also explains why the introduction of an acetyl group renders alcohol odorous and aniline inodorous.

**Pinus halapensis and Pinus maritima,  $\alpha_D$  of the Oil of Turpentine from.** D. E. Tsakalotos. (*Gazz. Chim. ital.*, 1917, 47, [1], 285, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 1069.) *Pinus halapensis*, which is cultivated in Greece, is difficult to distinguish botanically from *P. maritima*, which grows in France, Spain, and Italy. The essential oil distilled from the former is invariably dextrorotatory, having the  $\alpha_D + 47^\circ$  to  $48^\circ$ . The essential oil of *P. maritima*, on the other hand, is laevorotatory, having the  $\alpha_D - 40.5^\circ$ . Statements as to the  $\alpha_D$  of *Pinus halapensis* turpentine oil given in textbooks are erroneous.

**Russian Essential Oils.** G. V. Pigulevskii. (*Soobshch. Biuro Chastn. Rast. (Petrograd)*, 3, [3], 3, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2944.) The oils of *Ruta graveolens*, *Rosmarinus officinalis*, *Ocimum basilicum*, *Laurus nobilis*, *Hyssopus officinalis*, *Salvia grandiflora*, and *Lavandula spica* were examined. It was found that the Crimean ethereal oils do not differ essentially from those imported.

**Salvia sclarea, French, Essential Oil of.** (*Perfum. Record*, 1918, 9, 64.) Oil of clary, also known as "musk sage" and "toute bonne," distilled in the Alpes maritimes, is but little known in this country. The plant has a high local reputation for medicinal value, and the flowers are also used to impart a muscatel flavour to wine. The essential oil is pale yellow and

has a musk-like aroma; sp.g. 0.8953 to 0.896 at 30° C.;  $a_D$  -11° to -19°; esters 56 to 72.5 per cent. (See also *Y.B.* 1906, 69.)

**Terpene Derivatives, Reactions of.** C. T. Bennett. (*Perfum. Record*, 1918, 9, 87.) The characters, tests and chief derivatives of the following terpene alcohols are given: Borneol, iso-borneol, thujol, fenchol, sabinol, pinocarveol, and myrtenol.

**Thymol, *Ocimum viride* as a Source of.** (*Bull. Imp. Inst.*, 1917, 15, 324.) The leaves of the labiate *Ocimum viride* grown in Seychelles yielded 0.5 per cent. of oil when gathered in October, when flowering was just commencing. A further cutting made 4 months later in the rainy season, when the whole of the green parts of the plant were distilled, gave 0.45 per cent. The oil first distilled has the sp.g. 0.942,  $a_D$  +1° 5'; phenols 6 per cent.; soluble 1:3.1 of EtOH 70 per cent. The second lot of oil from the green herb had the sp.g. 0.924,  $a_D$  +0.6°; phenols 52 per cent.; insoluble 1:20 of EtOH 70 per cent.; soluble 1:1.4 of EtOH 80 per cent. The phenol appears to be practically all thymol. The oil would therefore probably prove a useful source of that substance, and the plant is worthy of systematic cultivation in the Colony. (For other *Ocimum Oils* see also *Y.B.*, 1905, 119; 1908, 144; 1909, 64; 1910, 87; 1911, 74, 77; 1912, 74.)

**Valerian, Yield of Essential Oil from Roots of.** Soederberg. (*Schweiz. Apoth. Zeit.*, 1918, 56, 161.) The amount of essential oil was determined by neutralizing the free acid in the aqueous distillate from the drug; shaking out with Et<sub>2</sub>O; separating and evaporating that solvent and weighing the residue. In the spring of 1917 the drug derived from *Valeriana officinalis* gave 2.12 per cent. of essential oil, or 2.43 per cent. on the dry material. *V. sambucifolia* gave 2.82 per cent., or 3.18 per cent. on the dry material. In the autumn, *V. officinalis* gave 1.73 per cent. and *V. sambucifolia* 2.02 per cent., equivalent to 2 and 2.3 per cent. respectively on the dry material.

(These figures are higher than those usually obtained in this country.—ED. *Y.B.*)

## FATS, FIXED OILS, AND WAXES

**Argan Oil, a Substitute for Olive Oil.** S. BERNUS. (*L'Union pharm.*, 1917, **58**, 273.) Argan oil is expressed in Morocco from the kernels of the fruits of *Rhamnus Siculus*, Linn (*Sideroxylum spinosum*, Lamarck), a tree which is indigenous and limited to Morocco. The oil closely resembles olive oil in many characters; its flavour is a little more nutty and its colour darker. Its Reichert-Meissl value 6.07 is high, and the titre value is 25° C. Among other characters the following were found for the specimen examined: Sp.g. 0.918; acidity as oleic acid 3.63 per cent.; saponification value 190; Huebl value 100.58; congealing point of oil — 17° C.; the oil will prove an excellent dietetic substitute for olive oil. The press cake affords a valuable food for stock.

**Basking Shark Liver Oil, Hydrocarbons in.** M. TSUJIMOTO. (*J. Ind. Eng. Chem.*, 1917, **9**, 1098.) The Arctic basking shark, *Cetorhinus maximus*, the largest of all living fishes, is occasionally found off the Japanese coast. Its liver is immense, often weighing as much as 1 ton and yielding some 5 cwt. of oil. Three authentic samples of basking shark liver oil examined by the author were pale yellow to orange-yellow liquids of low sp.g. and contained 41.92–55.51 per cent. of unsaponifiable matter. They contained squalene,  $C_{30}H_{50}$ , found by the writer in certain Japanese shark liver oils (*Y.B.*, 1916, 130.) This is important as an instance showing that the occurrence of squalene is not limited to the liver oils from the sharks belonging to the family *Squalidae*. One of these oils had the sp.g. at 15°/4° C., 0.8839; acid value, 1.09; saponification value, 102.45; iodine value (Wijs), 178.30; refractive index at 20° C., 1.4773; butyro-refractometer at 20° C., 78.2; unsaponifiable matter, 41.92 per cent.

The unsaponifiable matter was, for the most part, a liquid. One hundred Gm. of the oil were distilled under 5 mm. pressure. At 170–190° C., 10 Gm. (or 10 per cent.) of a pale yellow liquid distilled over. It had the  $n_{D20^{\circ}C.}$  1.4775. This substance was, therefore, different from squalene. On changing the receiver and raising the temperature a further distillate was obtained, b.p. 244–260° C., amounting to 25 Gm., or 25 per cent. of the original oil. This latter distillate was found to consist mainly of squalene.

The first distillate was washed with aqueous NaOH solution



to remove free fatty acids, and then 8 Gm. of this purified substance were distilled under 13 mm. pressure. It distilled over at 160–166° C., mainly at 164° C., leaving a small residue. The distillate was a colourless, mobile liquid which did not solidify even when cooled to below 0° C. It had the sp.g. 0.7868 at 15° C., 0.7815 at 20° C., 0.7789 at 28° C. (water at 4° C. = 1), and the  $n_{D20^{\circ}C.}$  1.4398; iodine value 4.40; soluble in EtOH; when mixed with strong  $H_2SO_4$ , the acid layer turned brown, and on raising the temperature to about 100° C., the coloration became darker, but the distillate on the upper layer was not readily attacked. No insoluble hydrochloride was formed by passing dry HCl into the well-cooled ethereal solution of the substance. When heated under 766 mm. pressure, the substance began to boil at about 294° C., and mainly distilled over at 296° C. The distillate thus obtained had the  $n_{D20^{\circ}C.}$  1.4395, which was nearly identical with that of the original substance. Ultimate analysis showed that it consists, in the main, of an octadecane or  $C_{18}H_{38}$ . But as normal octadecane is solid at the ordinary temperatures, the substance must be at least an iso-octadecane. Its comparatively low boiling point may be attributed to this cause. On the other hand, a mixture of hydrocarbons may be present. The other two samples of the oil did not contain this particular hydrocarbon, which cannot therefore be regarded as an essential constituent of the oil (See also *Y.B.*, 1917, 25.)

**Castor Oil, Simple Tests to Detect Presence of Foreign Oils**  
in. C. F r a b o t. (*Annales Chim. Analyt.*, 1917, 22, 217, 1918, 23, 7.) Now that castor oil is largely employed as a lubricant for aeroplane motors, it is of great importance that it should be pure and free from oils of higher congealing point. The author finds in the solubility of pure castor oil in EtOH and in its relative insolubility in petroleum ether two simple means of detecting adulteration, and specially that with arachis nut oil. A solution of pure castor oil 1 vol. in EtOH 95 per cent., 5 vols. remains clear and bright when cooled even to –20° C. If it contains more or less arachis oil a greater or less turbidity develops on cooling. Thus with 5 per cent. of arachis oil turbidity appears at 6° C., and it is quite cloudy at 5° C.; with 4 per cent. at 3° C.; with 3 per cent. at 0° C.; with 2 per cent. at –2° C.; with 1 per cent. at –4°, and quite cloudy at –9° C. For the petroleum ether test, the author employs the

commercial product boiling between  $35^{\circ}$  and  $70^{\circ}$  C. Twenty c.c. of castor oil is vigorously shaken up in a graduated stoppered cylinder with 80 c.c. of the petroleum ether then set aside to separate. When this is complete, the lower layer, if the castor oil is pure, is seen to have increased in volume, due to the petroleum ether dissolved therein. This increase is approximately 12 c.c. and lessens, obviously as the oil contains more foreign admixture. In the same manner, the amount of oil taken into solution increases. The solubility of pure castor oil in petroleum ether, under the conditions of the experiment, is very constant. The author found it to vary from 8.39 to 8.85 per cent. with 12 samples, giving a mean of 8.52 per cent. To determine this 50 c.c. of the above petroleum ether solution is evaporated in a tared capsule. Any residue above the 8.52 per cent. given by pure castor oil may be taken as being foreign oil. Since the residue from this petroleum ether solution is relatively richer in the adulterant than the original mixture, the identification of the added oil such as arachis oil becomes simplified even when present in small quantity.

Further investigation has shown that the amount of castor oil dissolved in commercial petroleum ether (petrol) is much influenced by the temperature at which the experiment is conducted, and by the sp.g. and b.p. of the solvent. Castor oil is more soluble in the higher boiling fractions of petrol than in the lower. Consequently it is recommended that the test should be made at the definite temperature of  $20^{\circ}$  C. The solvent used should be the lower fractions of petrol distilling between  $35^{\circ}$ – $65^{\circ}$  C. Under these conditions the increase in volume of the solvent amounts to 11.5 c.c. and the weight of castor oil dissolved to 8.85 Gm. with pure oil

**Castor Oil Testing.** M. C h e r c h e f f s k y. (*Annales Chim. Analyt.*, 1918, **23**, 75.) The author prefers the use of EtOH 85 per cent. for testing castor oil, since it is more definite, and when employed as suggested extremely sensitive. It depends on the critical temperature of solution of the oil. This is determined as follows: Ten drops of the oil and 40 drops of EtOH 85 per cent. (sp.g. 0.8481) are introduced into a tube 9 or 10 cm. long and 6 to 8 mm. wide by means of a very fine pipette. The tube is then sealed and attached to a thermometer immersed in an oil or glycerine bath as in taking m.p.s. Gradually the meniscus flattens: the tube is then turned over to

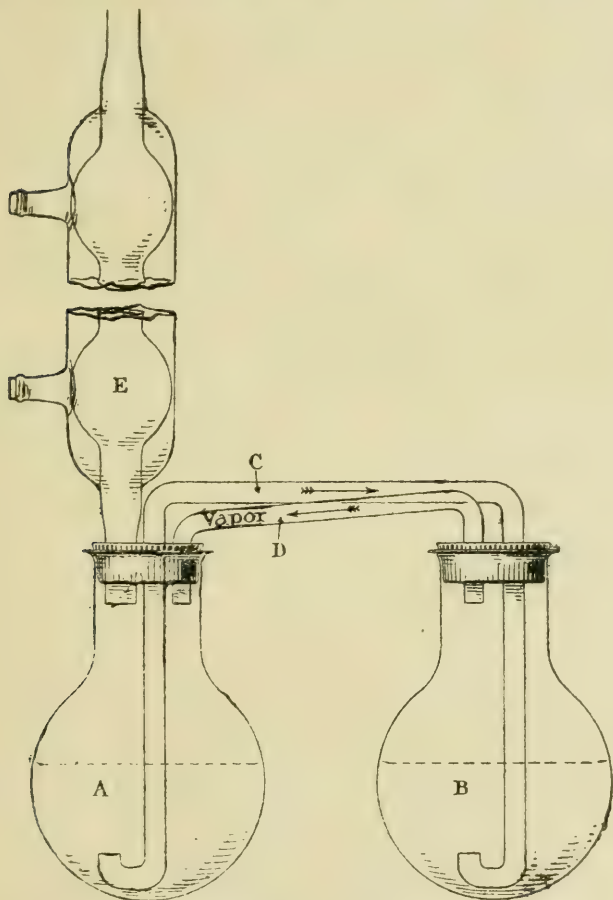
obtain a perfect mixture. When a clear solution is obtained, the whole is allowed to cool, the thermometer and the attached tube being constantly moved. As soon as a persistent turbidity is evident the temperature is read. This is the critical temperature of solution. With pure castor oil of first pressing this was found to be  $66^{\circ}\text{C}$ ., with second pressings  $67^{\circ}\text{C}$ . The addition of only 2 per cent. of foreign oil appreciably increases this critical temperature, and with 5 per cent. it is very considerable. A table is given showing the rise in the critical temperature of solution with the addition of various oils to castor oil. (See also *Y.B.*, 1905, 473; 1906, 19; 1907, 112; 1911, 93, 112; 1914, 76; and *Gen. Index*.)

**Ceroxylum andicolum, Wax from Leaves of.** (*Bull. Imp. Inst.*, 1917, 15, 182.) A new crude wax from the leaves of the wax palm *Ceroxylum andicolum* has been received from Columbia. As received, it consisted of a pale straw-coloured powder, containing 6.5 per cent. of vegetable impurities. When freed from this by treatment with  $\text{CCl}_4$  the wax obtained had the following characters: Sp.g. 1.018; acid value, 19.8; saponification value, 73.7 to 104.4; iodine value, 32.8; m.p.  $93^{\circ}\text{C}$ . It would probably find practical use as a substitute for carnauba wax, if sent over previously melted and freed from vegetable impurity.

**Cherry Kernels, Fixed Oil of and Extraction Apparatus employed for obtaining.** H. L. Maxwell. (*Chem. News*, 1918, 117, 122.) Cherry kernels yielded 37.6 per cent. of oil to extraction with  $\text{Et}_2\text{O}$ . The oil was yellow, pleasant flavoured and nutty. Sp.g. 0.922 to 0.925; saponification value, 276.8. On exposure to  $-5^{\circ}\text{C}$ . about 10 per cent. of the oil separated out. The remaining 90 per cent. remained clear at  $-18^{\circ}\text{C}$ . In general reactions the pale yellow oil, separated from the portion congealing at  $-5^{\circ}\text{C}$ ., resembles almond oil. (See also *Y.B.*, 1916, 115) For the extraction of the kernels, the apparatus figured was employed.

The material to be extracted is placed in flask *A*. Both flasks are then half filled with the solvent,  $\text{Et}_2\text{O}$ ,  $\text{EtOH}$ , or water, as the case may be. The siphon is then filled with the solution and both flasks heated on a water-bath. The  $\text{Et}_2\text{O}$  vapour created in flask *B* will force its way through the short siphon into flask *A*, where it is condensed by the condenser above. The vapour from flask *A* will condense in the same way and return

to the same flask. This operation lowers the level of the liquid in flask *B* and raises the level in flask *A*, thus starting the siphon which carries the oil laden  $\text{Et}_2\text{O}$  from flask *A* to *B*. Here the  $\text{Et}_2\text{O}$  vaporizes, leaving its burden of oil in flask *B*, and return-



ing in the form of vapour to flask *A* to be condensed and begin anew its cycle of extracting, transporting, and depositing another portion of oil. This apparatus has been used with various solvents and on different substances. In each case it has been found to be accurate and very economical in both time and solvent.



**Carp, Loach, and Trout Oils.** M. Tsujimoto. (*Jap. J. Chem. Ind.*, 1917, 20, 711, through *J. Soc. Chem. Ind.*, 1918, 37, 63A.) The following characters were possessed by these oils :—

Oil from :	Sp.g. at 15° 4' C.	Acid Value.	Saponif. Value.	I Value (Wijs).	$n_D^{20}$ °C.	M.p. of Fatty Acids.	Insol. Bromide from Fatty Acids.	Bromine in Insol. Bromide.
Carp ( <i>Cyprinus carpio</i> ) . . .	0.9262	1.1	193.7	137.04	1.4756	° C. 29-30	Per cent. 28.29	Per cent. 63.77
Loach ( <i>Misgrurnus anguillicaudatus</i> )	0.9212	—	206.1	121.69	1.4740	31-32	25.45	68.01
Trout (a variety of <i>Oncorhynchus nerka</i> ) . . .	0.9305	1.8	196.7	176.98	1.4796	32	46.31	68.10
Trout ( <i>Salmo iri- dens</i> ) . . .	0.9229	1.3	198.1	125.90	1.4736	33.5	22.97	68.63

The bromide from carp oil consists mainly of linolenic hexabromide with a small proportion of polybromides. The insoluble bromides from the fatty acids of the other oils behaved in the same way on heating as the bromides from marine animal oils, but contained a smaller proportion of Br.

**Dogfish Liver Oil.** A. C. Chapman. (*Analyst* 1918, 43, 156.) The oil was prepared from the minced steamed livers of the common "piked" or "spur" dogfish *Squalus acanthius*. The yield was 40 to 50 per cent. of pale yellow oil with a slightly fishy odour.

Two specimens of oil prepared from different batches of liver gave the following results : Sp.g. (15°/15° C.), 0.9175 and 0.9186 ; saponification value, 161.0 and 168.3 ; iodine value (Wijs), 123.3 and 123.0 ; free fatty acids (as oleic acid), 0.33 and 0.42 per cent. ; unsaponifiable matters, 32.94 and 9.48 per cent. ;  $n_D^{20}$  1.4755° and 1.4749° ; brominated glycerides insoluble in ether, 19.25 and 24.95 per cent. ;  $\alpha_D$  — 1.45°.

Both the above samples of oil had been cooled to — 10° C. for a considerable time and filtered through fine linen, in order to remove the crystalline matter which separated. This was found to contain only 7.3 per cent. of unsaponifiable matters, so that it evidently consisted chiefly of glycerides.

The results for the second oil agree very closely with those obtained by Thomson and Dunlop. The percentage of unsaponi-

fiable matters in the first oil is, however, very much higher, and assuming that all the livers submitted were from the spur dogfish, it would appear to indicate that the percentage of unsaponifiable matter in this oil is subject to wide variations. At the present moment the precise physiological relationship between unsaponifiable matters and glycerides in the livers of fish is not known; but as these two classes of compounds must be in a constant state of change, and are doubtless dependent on the age and condition of the individual fish, these differences are only such as are to be expected.

When sufficient material is available this unsaponifiable matter will be further examined to determine if it contains spinacene which has been shown to be present in the liver oils of certain fish belonging to the same natural family.

These two samples gave the following colour reactions :—

One drop of a mixture of 1 volume of oil with 1 volume of $\text{CS}_2$ was introduced into strong $\text{H}_2\text{SO}_4$ .	Deep violet, rapidly turning brown.
One drop of strong $\text{H}_2\text{SO}_4$ added to a solution of 1 drop of the oil in 1 c.c. of $\text{CHCl}_3$ .	Pale blue, becoming deep reddish-violet on stirring, then gradually fading to reddish-brown.
Two c.c. of a solution of sodium phosphomolybdate acidified with $\text{HNO}_3$ added to a solution of 1 c.c. of the oil in 5 c.c. of $\text{CHCl}_3$ .	The chloroform layer acquired a pale green colour.
$\text{AmOH}$ added to the preceding solution.	The green colour became bluish-violet.
Three drops of fuming nitric acid were cautiously added to about 10 drops of the oil.	Purple, changing on stirring to dark reddish-brown.

**Echinocystis oregana** Seeds, Fixed Oil of. M. R. Daughters. (*J. Ind. Eng. Chem.*, 1918, 10, 126.) The "wild cucumber," *Echinocystis oregana*, commonly occurs from British Columbia to California. Specimens of the seeds collected in three successive years had the following composition: Crude fat, 30.11 to 35.45; proteins, 20.64 to 23.71; starch, 9.20 to 12.05; crude fibre, 20.01 to 22.07; moisture, 3.90 to 4.54; and ash, 2.6 to 2.89 per cent. Oils expressed in the cold

and extracted with petroleum ether had the following characters :—

	Sp.g. at 25° C.	$n_D^{25}$	Solidif. Point.	Iodine Value.	Saponif. Value.
			°C.		
Extracted oil . .	0.9267	1.4722	+5 to -8	116.5	193.4
Expressed oil . .	0.9166	1.4701	+5 to -8	117.0	189.1

Freshly-ground seeds yielded an olive-green oil with a taste resembling that of olive oil. On exposure to light the colour faded in a few days to golden yellow. Hydrogenated with a nickel catalyst at 220°–240° C. it yielded a yellowish-white fat which melted at 29°–36° C. and had an iodine value of 76.6. Feeding experiments with mice showed that the original oil and the hydrogenated fat were non-poisonous.

**Fats, Medicinal, Oxidizability Values of.** G. Issoglio. (*Annali Chim. applic.*, 1917, **7**, 187, through *Analyst*, **42**, 301.) The method of estimating the oxidizability of oils and fats affords a means of judging as to their suitability for medicinal purposes. From the examination of a large number of oils used in medicine, including olive, almond, and cod-liver oils and lard, the conclusion is drawn that their oxidizability value should not exceed 10. In the case of castor oil, however, the oxidizability value does not afford the same information as to the age of the oil, since even when the oil has a high acid value and is old only relatively small amounts of volatile aldehydic and ketonic compounds may be formed. For example, it was found that castor oils of various origin, free from EtOH, showed acid values ranging from 7.52 to 18.23, whilst the oxidizability values varied from 0.85 to 3.18. The presence of traces of EtOH will affect the results. Under the conditions of the estimation 1 Mgm. of EtOH would reduce  $1.738 \text{ c.c. of } \frac{N}{100} \text{ KMnO}_4 \text{ solution.}$

Samples of fresh olive oil from different parts of Italy showed acid values of 1.06 to 1.85 and oxidizability values of 2.85 to 3.18, whilst fresh Italian almond oils had acid values of 1.35 to 4.12 and oxidizability values of 1.18 to 3.15. Cod-liver oil which is of a reddish or brownish yellow colour should not be used in medicine, since it will almost certainly have undergone some decomposition, and will show a high oxidizability value.

For example, the following results were obtained with commercial samples of cod-liver oil :

Origin.	Colour.	Acid Value.	Oxidizability Value.	Iodine Value.
Labrador . . . .	Reddish	4.06	28.06	140.8
Newfoundland . . . .	Brown-red	20.42	43.96	157.15
Unknown (old) . . . .	Reddish	37.42	69.72	138.84
„ . . . .	Brown-red	28.47	51.22	132.3
Hamburg . . . .	Light red	38.42	67.12	135.4
Japan . . . .	Nearly colourless	2.35	6.41	145.8
Norway . . . .	Pale yellow	1.84	6.30	157.4
Hamburg . . . .	„	8.07	12.3	153.8

If mercurial ointment contains fat with a high oxidizability value (e.g., 18 to 19) the use of rancid fat is indicated, whilst an abnormally high value (e.g. 74 to 100) points to the presence of oil of turpentine.

**Globe-fish and Angler-fish Liver Oils.** M. Tsujimoto. (*Jap. J. Chem. Ind.*, 1917, 20, 709, through *J. Soc. Chem. Ind.*, 1918, 37, 63A.) Globe-fish liver oil from *Spheroides porphyreus* is a yellow liquid, which has a characteristic odour and deposits "stearine" at the ordinary temperature. It gives a red colour with a purplish shade on treatment with  $H_2SO_4$ . Angler-fish liver oil from *Lophiomus setigerus* is a yellowish-orange liquid, which deposits "stearine," has a peculiar odour, and gives a reddish-purple colour with  $H_2SO_4$ . These oils had the following characters :—

Oil from :	Sp.gr. at 15°/4° C.	Acid. Value.	Saponif. Value.	I value (Wijfs).	$n_{D20}^{\circ}$ C.	Unsap. Matter.	M.p. of Fatty Acids.	Insol. Bromide from Fatty Acids.	Br. in Insol. Bromide.
Globe-fish liver	0.9269	0.88	182.2	159.8	1.4785	1.47	31-32	46.65	70.22
Angler-fish liver	0.9268	1.1	188.6	154.1	1.4790	1.00	32.5-34	44.13	70.65

The unsaponifiable matter from both oils melted at 100° C., and was free from the hydrocarbon, squalene, present in shark liver oil. (See also *Y.B.*, 1917, 21.)

**Jatropha curcas, Oil from the Seeds of.** (*Rev. agric. et vétérin. de Madagascar*, 1917, 2, [8], 37, through *J. Soc. Chem. Ind.*,



1918, 37, 63A.) The physic nut is at present obtained almost exclusively from the Cape Verde and Comoro Islands, and before the war about 500-600 tons was imported into France annually. Analysis of samples from Madagascar gave the following results : 1000 seeds weighed 535 Gm. ; the seeds consisted of 39.2 per cent. of shell and 60.8 per cent. of kernel, and the kernels contained 7 per cent. of moisture and 52 per cent. of oil. The oil-content of the whole seeds was 31.6 per cent., corresponding to a commercial yield of 27-28 per cent., since 4-8 per cent. of the oil would remain in the cakes. Pulza-oil (curcas-oil) is used in soap-making as a substitute for low-grade pea-nut oil, and it might also be employed in stearin factories. Its low acidity should render possible its application as a lubricant. (See also *Y.B.*, 1911, 97 ; 1914, 209 ; and *Gen. Index.*)

**Lavatera thuringiaca and other Malvaceous Plants, Fixed Oils of.** S. L. Ivanov and N. F. Kokotkina. (*Soobshch. Biuro Chastn. Rast. (Petrograd)*, 2, No. 7, 3, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2917.) There are many valuable species of Malvaceae which as yet are not used commercially, such as *Lavatera thuringiaca*, Malva, and other fibre species. The oils of the 30 species of Malvaceae which were studied do not differ essentially from cottonseed oil. The oils of the Malvaceae and those of the nearest forms of the Tiliaceae are both characterized by the Halphen's reaction, which indicates the presence of a peculiar unsaturated acid in these groups. The presence and the formation of this acid unites these two families. The hairs of the seed coating of some of the other species of Malvaceae are considered to be very similar to cotton fibre. The possibility of successful crossings between *Gossypium* and other Malvaceae is suggested.

**Palm Oil, Methyl nonyl ketone from.** A. H. Salway. (*J. Chem. Soc.*, 1917, 111, 407.) The volatile matter removed from palm oil by steam distillation in the deodorization process consists of a semi-solid fatty mass holding water in a state of emulsion. The material investigated contained 30 per cent. of free fatty acids, 26 per cent. of neutral fat, 1.2 per cent. of neutral volatile oil, and 28.7 per cent. of water. The odour and taste of the original oil are essentially due to the volatile oil and to a minor extent by the volatile fatty acids. The crude material was again distilled in a current of steam, the volatile oil dissolved in  $\text{Et}_2\text{O}$  and shaken with NaOH solution to remove

fatty acids, and methyl nonyl ketone isolated from the neutral volatile oil by means of its  $\text{NaHSO}_3$  compound. In an experiment starting with palm-kernel oil, 1200 Gm. of the oil yielded 1.4 Gm. (0.12 per cent.) of neutral volatile oil containing 90 per cent. of methyl nonyl ketone. Coconut oil treated in the same way yielded 0.03 per cent. of neutral oil, of which only 30 per cent. could be converted into a semicarbazone.

**Shark Liver Oil, a highly unsaturated Hydrocarbon in.** M. Tsujimoto. (*Jap. J. Chem. Ind.*, 1917, **20**, 953, 1069, through *J. Soc. Chem. Ind.*) Several samples of shark liver oil obtained from 27 species of sharks caught in Japanese waters have been investigated. The oils have been classified in two groups: (1) those with sp.g. below 0.9000 at  $15^\circ/4^\circ \text{C.}$ , and (2) those with sp.g. above 0.9000 at  $15^\circ/4^\circ \text{C.}$  The shark liver oils of the first group, most of which are derived from sharks of the family *Squalidae*, are all rich in the hydrocarbon squalene,  $\text{C}_{30}\text{H}_{50}$ , whereas the oils of higher sp.g. are free from squalene, with the exception of Karasuzame oil (10 per cent.) and Fujikujira (*Etmopterus lucifer*) oil (1 per cent.). The oils of the first group are characterized by high iodine values and low saponification values. The hexahydrochloride and other additive and decomposition of squalene are described.

**Spinacene and its Derivatives.** A. C. Chapman. (*J. Chem. Soc.*, 1918, **113**, 458.) Further investigation of the hydrocarbon of shark liver oil, spinacene, has been conducted. The formula  $\text{C}_{29}\text{H}_{48}$  is confirmed. The hexahydrobromide has been prepared; the action of  $\text{HNO}_3$  on the hydrocarbon studied; and the decomposition products obtained by distilling spinacene under 40 mm. pressure over Na investigated. Two fragrant terpenic substances were thus obtained. One is probably cyclo-dihydromyrcene or cyclo-linalolene. The other has not yet been identified.

**Vegetable Wax, New, from Ecuador.** (*Oil, Paint, and Drug Report*, 1917, **92**, (12), 50K.) From prehistoric times the Indians of Ecuador have utilized a wax found on certain species of tall palms for making candles. This wax occurs on the tree trunks in granular form, each tree furnishing about 50 pounds. The trees grow in great numbers on the mountains along the coast. Samples of this wax were sent to France and Germany, from which countries favourable reports were received, but the war ter-

minated further negotiations. It has been asserted that it could be used in the manufacture of explosives. It is estimated that it would be possible to deliver 15 to 20 tons, or even more, each month if a commercial demand should arise.

**Vegetable Wax, Japanese ; Method of Production.** (*Oil, Paint, and Drug Report*, 1917, **92**, [19], 17.) The principal regions of production of Japanese wax are in the Island of Kyushu, especially around the city of Fukuoka, which accounts for nearly half of the total output. This vegetable wax is derived from the fruit kernels of a tree peculiar to Japan, which begins to fruit at about 15 years, and sometimes bears heavily when it is over 100 years old. It reaches a height of 20 to 25 feet, and produces from 30 to 150 pounds of nuts annually. The best wax is made from nuts that have been kept over the winter, and generally speaking, the quality of the product improves with the age of the nut. The wax is extracted by crushing and steaming the nuts, and then subjecting the mass to pressure. A second wax is secured by repressing. One workman can handle about 150 pounds of raw mass in a day, and this produces about 16 pounds of wax. The crude wax, which solidifies at 50° C., is cast into round moulds of a little more than a pound each. It is next refined, mixing it with wood or charcoal ash and water, thoroughly boiling and dropping into cold water, so as to form what are called wax flowers. These are taken out and exposed to the sun for about 20 days, when the process of boiling, making the flowers, and sunning is repeated. The wax is then boiled a third time, and the best quality taken off the top while it is melted. Recently, improved methods have begun to come into use, and the crude wax is treated with an alkaline solution.

**Ximenia Americana Fruits from South Africa.** (*Bull. Imp. Inst.*, 1917, **15**, 313.) The fruit, variously named "wild olive," "wild lime," "mountain plum," "citron of the sea," is stated by some writers to be edible, and by others to be poisonous. There is a similar diversity of opinion as to the character of the kernels of the fruit. Several authors have found them to yield HCN. The fruits received from the Northern Transvaal had the reddish brown pulp adhering. When this was removed the nuts gave 75 per cent. of kernels. These kernels gave no trace of cyanogenetic glucoside. They yielded 65.8 per cent. of oil to extraction with light petroleum and 65.8 to acetone.

The yellow oil was slightly cloudy, becoming clear on warming. It was viscous : that obtained with petroleum being more viscous than the acetone extracted oil. This viscosity is attributed to the presence of a rubber-like substance. The characters of the two oils are given.

## GLUCOSIDES, SUGARS, AND FERMENTS

**Beans Yielding HCN Barred from Importation into U.S.A.** (*Oil, Paint, and Drug Report*, 1917, **92**, [19], 18.) Beans which yield HCN in any considerable amount will be prohibited importation, according to a customs ruling issued by the Treasury Department of the U.S.A. All importations of beans and peas, excluding soya beans, will therefore be held for examination by the Food and Drug Laboratories, and will not be liberated for import until proved to be free from cyanogenetic glucosides. (See also *Y.B.*, 1904, 140 ; 1909, 49.)

**Chrysarobin, Commercial, Constituents of a Correction.** R. E d e r. (*Arch. Pharm.*, 1916, **254**, 1, through *Chem. Abstr. Amer. Chem. Soc.*, 1918.) The last sentence of the abstract in *Chem. Abstr. Amer. Chem. Soc.*, 1916, **11**, 1252 (*Y.B.*, 1917, 120) should read : " Of the substances which Tutin and Clewer claim to have isolated, the author was able to corroborate their findings except with respect to chrysophanic acid and ararobinol."

**Derris Elliptica, Active Principle of.** T. I s h i k a w a. (*Tokyo Igakkwai Zasshi*, 1916, **30**, 45, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2371.) Tuba is the Malay name for the fish poison *Derris elliptica*. From this the author has isolated tubatoxin,  $C_{18}H_{18}O_5$ , in white crystals from EtOH, m.p.  $163.5^{\circ}C$ ., soluble in most organic solvents, but not in water or in acids and alkalis ; it reduces ammoniacal silver and alkaline copper solutions ; a sensitive colour test is described. Tubatoxin produces in fish, frogs, and mammals general motor paralysis. The lethal intravenous dose for a rabbit is 0.0009 Gm. per kilo. (See also *Y.B.*, 1903, 71 ; 1905, 202 ; 1911, 199 ; and *Gen. Index*.)

**Digitalis Plants, The Development of the Typical Glucosides of the Leaf of.** W. S t r a u b. (*Biochem. Zeitsch.*, 1917, **82**, 48, through *J. Chem. Soc.*, 1917, **112** [1] 617). The amount of the gluco-



sides in different stages of the growth of the plant was estimated by ascertaining the number of lethal doses for a frog in different fractions. The glucosides in question are digitalinum verum and digitalein, which are soluble in water, and both of which are found in the seeds, and digitoxin, which is insoluble in water, but soluble in chloroform, and "gitalin," which is soluble in chloroform and cold water, which are found in the leaves. Digitalein also occurs in the leaves. It was found that the glucosides of the seeds are not reserve material, but disappear during germination, and are stored in the leaves, in which organs they do not increase further in quantity. The glucosides proper of the leaves make their first appearance in the earliest foliage leaves and continue to increase in quantity until they form 1 per cent. of the dried matter. Reasons are given for supposing that they are only waste products of the metabolism of plant growth.

**Digitalis Seeds and Leaves, Relative Proportions of the Active Constituents in.** W. Straub. (*Arch. Exp. Pathol.*, 1916, **80**, 52, through *Journ. Soc. Chem. Ind.*, 1917, **36**, 734.) The methods used for the isolation and purification of the active principles of digitalis involve large losses. The estimation has been made physiologically by determining the minimum lethal dose of the total extract and of the single fractions. In the case of the seeds, a cold water extract contained 1.3 per cent. of active principles on the dry material, the greater part consisting of substances (*digitalinum verum* and digitalein) not shaken out by  $\text{CHCl}_3$ . The small portion soluble in  $\text{CHCl}_3$  apparently contained only traces of these substances. Practically no further quantity of active principles was obtained from the residue by extraction with 96 per cent. EtOH. From the leaves, cold water extracted about two-thirds of the active constituents and 50 per cent. EtOH about one-third. From the cold water extract  $\text{CHCl}_3$  dissolved 64 per cent. (gitalin), (24%) 42 per cent. remaining insoluble: the loss of about 12 per cent. is probably due to the transformation of the lactone, digitalein, into the inactive acid. The treatment of an infusion prepared in the official manner confirmed the observation of Kraft that owing to the high temperature an appreciable loss of water-soluble active glucosides takes place. It is confined to the digitalein fraction; the gitalin fraction is indeed increased, but apparently through the formation of digitoxin, since the real gitalin is decreased. Similarly the titration value of the gitalin fraction

is considerably diminished by heating a cold-water extract and to the same extent that of a chloroform extract of this infusion, as well as of pure gitalin. The treatment of the extract with alcohol in the cold also lowers the titration value, confirming the observations of Kraft with gitalin. (See also *Y.B.*, 1916, 141.)

**Enzymes of Oil-bearing Seeds, Ureases.** O. Fernandez and A. Pizaroso. (*Annales Soc. Espan. Fis. Quim.*, 1917, 15, 209, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 372.) The following oily seeds were examined: Poppy, almond, hazelnut, peanut, hemp, maize, walnut, pine kernel, and castor oil. All these contain urease, the action of which was greatest in pine kernels and least in maize. Details of experiments are given showing the different behaviour of the ferments under the influence of various phenols, and in presence of different nutrient substances under varying conditions. The results indicate that the ureases present in different seeds are distinct ferments.

**Formaldehyde, Action of, on Lactose, Maltose, and Sucrose.** A. Heiduschka and H. Zirkel. (*Arch. Pharm.*, 1916, 254, 456, through *J. Chem. Soc.*, 1917, 112, [1], 446.) The observations previously recorded in literature on the action of  $\text{CH}_2\text{O}$  on different sugars are contradictory. The authors have examined the substances obtained from  $\text{CH}_2\text{O}$  and lactose, maltose, or sucrose in aqueous solution.  $\text{CH}_2\text{O}$  and the biose yield products the compositions of which vary with the relative proportions of the sugar and  $\text{CH}_2\text{O}$  used in the preparation, and any one product does not differ in essential chemical characteristics from any other product or from its components. The products therefore are not to be regarded as definite chemical compounds. Products containing up to 39 per cent. of  $\text{CH}_2\text{O}$  have been prepared; from products containing a higher percentage paraformaldehyde separates. Products containing a high percentage of  $\text{CH}_2\text{O}$  yield products containing a lower percentage by evaporating their aqueous solution *in vacuo*. The capacity to take up  $\text{CH}_2\text{O}$  is different in the three bioses, being greatest in sucrose and least in maltose. The  $\text{CH}_2\text{O}$  in the products can be estimated by the sulphite method and the sugar polarimetrically, the sum of the two percentages being 100.

The authors have been unable to obtain from lactose and  $\text{CH}_2\text{O}$  substances having the compositions recorded by Oppermann and Goehde or by Rosenberg. The products lose all their

$\text{CH}_2\text{O}$  at  $190^\circ$  and leave pure lactose. They are soluble in  $\text{EtOH}$ . This is noteworthy since lactose is practically insoluble in this solvent. The authors find, however, that lactose is more soluble in  $\text{EtOH}$  containing  $\text{CH}_2\text{O}$  than in  $\text{EtOH}$  alone, and that the products mentioned above are more soluble in  $\text{EtOH}$  the greater is their  $\text{CH}_2\text{O}$  content; from such solutions lactose is deposited almost quantitatively as the  $\text{CH}_2\text{O}$  progressively reacts with the solvent. Other properties of sugar and  $\text{CH}_2\text{O}$  solutions, such as the sp.g. and the viscosity, have been examined, and the opinion is formed that the products obtained from  $\text{CH}_2\text{O}$  and a biose are solid solutions of  $\text{CH}_2\text{O}$  in the sugar. Since the sugar takes up relatively more  $\text{CH}_2\text{O}$  from dilute than from concentrated solutions, absorption processes would appear to be operative were it not that van Bemmelen's absorption formula ( $C_w^n/C\lambda=k$ ) is found not to hold.

**Gitalin (Pseudodigitoxin), Molecular Weight and  $\alpha_D$  of.** J. Burmann. (*Schweiz. Apoth. Zeit.*, 1918, 56, 28.) The  $[\alpha]_D$  of gitalin in  $\text{CHCl}_3$  solution is  $-25.2^\circ$  and in  $\text{EtOH}$  solution  $-18.8^\circ$ . The mean of several determinations gives 539 as the molecular weight: closely approximating to 544, that required by the formula  $\text{C}_{28}\text{H}_{48}\text{O}_{10}$  assigned to gitalin by Kraft. The so-called digalene or soluble digitoxin of Cloetta is merely an impure digitalein containing much gitalin. To this the formula  $\text{C}_{14}\text{H}_{23}\text{O}_5$  has been attributed and a molecular weight of 273 or 280. This is almost exactly half the molecular weight of gitalin, and arises, doubtless, from an error in interpreting the results of ultimate analysis. (See also *Y.B.*, 1913, 129, 131; 1914, 87; 1916, 141; 1917, 88.)

**Glucose, Lactose, and Maltose, Differentiation of, by a Mycological Test.** A. Castellani and F. E. Taylor. (*B.M.J.*, 1917, 2, 855.) Although German yeast has been used for the detection of glucose in pathological secretions, the growth obtainable under this name in London is not suitable for the purpose, since it ferments lactose as well as glucose. The authors use growths of other organisms, *Monilia balcanica*, Cast., *M. para-balcanica* and *M. Krusei*, which produce gas in glucose solutions but do not ferment maltose or lactose. They also employ growths of *Monilia pinoyi* or *M. tropicalis*, which ferment glucose and maltose but have no action on lactose. Instead of hyphomycetes, certain bacteria may also be used. Thus, *Bacillus proteus vulgaris* Hauser (P. I. strain) does not ferment

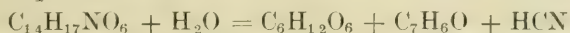
lactose, while it produces gas with maltose and glucose. *Bacillus diffluens*, Cast., does not ferment lactose or maltose but evolves gas from glucose solutions. To differentiate reducing substances in pathological secretions, a 1 : 100 solution of the substance in sugar-free peptone water is distributed into four tubes, each containing a Durham's fermentation tube. No. 1 is inoculated with *Monilia balcanica* or *M. parabalcanica*; No. 2, with *M. Krusei*; No. 3, with *M. pinoyi*; No. 4, with *M. metalondoninensis*. All are then incubated at 35° C. for 48 hours. If gas is then present in all four tubes, the reducing substance is *glucose*. If there is no gas in No. 1, but it occurs in the other three, *laevulose* is the reducing substance. If there is no gas in No. 1 and 2, but it occurs in No. 3 and 4, *maltose* is present. If tubes No. 1, 2, and 3 have no gas, but No. 4 shows it, the substance is *galactose*. If no gas is present in any of the tubes the reducing substance is either *lactose*, a *pentose*, or belongs to the creatin or uric acid group. The reducing substance with which none of the *Monilia* organisms react may be further investigated by means of other organisms. Two more tubes, No. 5 and 6, of the peptone water solution are inoculated: No. 5 with *B. coli*, Escherich, and No. 6 with *B. paratyphosus*, B. Schottmueller, using strains producing large volumes of gas. After 48 hours' incubation: If No. 5 contains gas and No. 6 none, *lactose* is present. If both tubes contain gas, a *pentose* is indicated. If no gas is present in either tube, one of the *unfermentable reducing substances*, such as uric acid, createnin, or hippuric acid is present. Tables are given showing the analytical results at a glance. *Urine Analysis*: The method is applicable to the identification of sugars in urine, provided the amount present is not below 0.1 per cent. The urine must be aseptic; or if it has not been aseptically collected, it must be sterilized as soon as possible, but should not be autoclaved as this procedure may alter the characters of the sugars present. It should be mixed with one-third or an equal volume of peptone water before inoculation, and then distributed into the sterile test tubes.

**Glucosides and Alkaloids, Influence of, on the Development of the Plant.** I. G. Ciamician and C. Ravenna. (*Atti. accad. Lincei.*, 1917, **26**, 1, 3-7, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 165.) The authors have previously suggested that alkaloids are capable of acting as vegetal hormones. The experiments here described were designed to test

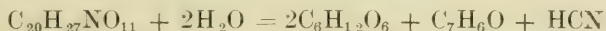


the truth of this suggestion. Previous experiments on the introduction of foreign compounds into plants showed no visible effect when the plant survived. It was thought that possibly supplying such compounds from the time of germination would produce a visible effect. The experiments were made on kidney bean and on corn seeds, using mandelic nitrile, nicotine, strychnine, caffeine, and morphine. Solutions of mandelic nitrile (0.1 per cent.) almost completely stopped germination of both kidney beans and corn. Solutions of amygdalin (0.55 per cent.) did not retard germination. These facts are of importance in explaining why seeds of Prunoideae do not contain mandelic nitrile. When germination was allowed to take place before supplying the nutrient solution containing no N except as mandelic nitrile the plantlets survived but developed curiously; they were shorter than the controls, the leaves were yellow and shorter than normal, the roots were less developed and the plants more resistant to cold. Contrary to the previous experiments, such plants treated as usual with or without the addition of emulsion showed no HCN nor BzH, indicating that the N of HCN was utilized by the plant. Normal plants of the same species are killed in 24 hours by 0.1 per cent. mandelic nitrile solutions. These seedlings are thus a new variety of *Phaseolus vulgaris* immune to mandelic nitrile. Seeds bathed with 0.1 per cent. HCN only germinate to the extent of about 30 per cent. The seedlings do not thrive and finally dry up. Thus here too the glucoside is an advantage, since it is known that *P. lunatus*, for example, contains the glucoside of acetone-cyanohydrin. The alkaloids were used in 0.11 per cent solutions as tartrates, except caffeine, which was used in the free state. Only 4 out of 30 kidney beans germinated in the presence of nicotine. By applying the poison only after germination the plantlets lived for some time but their growth was retarded and their appearance markedly altered. One Gm. of nicotine chloraurate was recovered from the plants. Strychnine does not influence germination of kidney beans nor corn, but after some days of normal life they dry up. One kilo of tobacco seeds gave 0.2 Gm. of nicotine hydrochloride; strychnine seeds contain 1.5 per cent. strychnine. These observations do not support the supposition that the alkaloids have no organic functions in plants but are only waste products. Caffeine and morphine behave like strychnine. Morphine was better tolerated than caffeine. (See also *Y.B.*, 1914, 2; 1915, 5.)

**Glucosides, Cyanogenetic, of the Amygdalin Group, Nomenclature of.** E. Bourquelot. (*J. Pharm. Chim.*, 1918, 17, 359.) There are six glucosides which yield dextroglucose, benzaldehyde and HCN under the influence of emulsin. Three of these have the formula  $C_{14}H_{17}NO_6$ : they are monoglucosides of phenylglycollic acid nitrile, and their hydrolysis is expressed by the equation:



The other three have the common formula  $C_{20}H_{27}NO_{11}$  and their hydrolysis is represented by the equation:



These six glucosides, in the chronological order of their discovery, are: amygdalin, Fischer's amygdonitrile glucoside, iso-amygdalin, sambunigrin, prulaurasin, dextro-amygdalin. Four of these are found in nature; amygdalin in bitter almonds, etc.; sambunigrin in elder leaves; prulaurasin in cherry laurel leaves; and amygdonitrile glucoside in the fruits of *Prunus Padus*. The name prunasin has been suggested for this. The relationship between these glucosides is summarized below:

$C_{14}H_{17}NO_6$	$C_{20}H_{27}NO_{11}$
Prunasin	Laevoamygdalin or glucoprunasin.
Prulaurasin	Iso-amygdalin or glucoprulaurasin.
Sambunigrin	Dextroamygdalin or glucosambunigrin.

When the three diglucosides are treated with dried bottom yeast, 1 mol. of glucose is split off and the corresponding monoglucoside is obtained, as shown in the first column. When the three monoglucosides are decomposed by boiling with strong HCl, they all yield phenylglycolic acid,  $NH_3$  and  $C_6H_{12}O_6$ . But from prunasin laevophenylglycolic acid, from prulaurasin, iso-phenylglycolic acid, and from sambunigrin dextrophenylglycolic acid result. The isomerism of the three glucosides is thus rendered clear.

**Glucosides of the Digitalis Group, New Reaction of.** H. Baljet. (*Schweiz. Apoth. Zeit.*, 1918, 56, 71.) The reagent consists of equal volumes of picric acid solution in EtOH 95 per cent. 1 : 100, and of NaOH solution (free from KOH) 1 : 100. A few drops of the reagent give a red to orange colour. The reaction is common to all the cardiotonic glucosides, digitoxin, gitalin, crystalline strophanthin, and kombistrophanthin. It is not produced with digitonin, arbutin, amygdalin nor condurangin, which are not

cardiac tonics. The maximum intensity of the colour is obtained in about 30 minutes. It is due to the lactone structure which is characteristic of these glucosides. (See also *Y.B.*, 1908, 66; 1911, 119; 1913, 117, 129; 1917, 88; and *Gen. Index.*)

**Glycerin Monoglucoside, Crystalline.** E. Bourquelot, M. Bridel, and A. Aubry. (*J. Pharm. Chim.* 1917, 16, 77). Three years ago (*Y.B.*, 1915, 145) the authors reported on the formation of two  $\beta$ -glucosides by the action of  $\beta$ -glucosidase on glycerol and glucose. At that time these had not been obtained crystalline. On setting aside for two years in an ice chest at a temperature of 5 to 6° C., an EtOH, Et<sub>2</sub>O solution of these glucosides was found to have deposited crystals in the form of small spherical masses of slender prisms. They had a sweetish bitter taste, the  $\alpha_D = -28.16^\circ$ . The glucoside is therefore the most optically active of the two formed by the action of the ferment. This is the first recorded instance of the preparation of a crystalline sugar derivative of glycerol.

**Glycerin retards the Hydrolyzing Action of Invertin.** E. Bourquelot. (*J. Pharm. Chim.*, 1917, 16, 346.) Glycerin itself entirely arrests the hydrolysis of saccharose by invertin. In a medium of water 70 and glycerin 30 hydrolysis was incomplete in 70 days, although in the control with water alone the sugar had entirely disappeared in 7 days. These experiments were made in the endeavour to find a neutral medium other than water, in which experiments might be conducted on the synthetizing activity of invertin. Hitherto this property has not been proved with this ferment. In aqueous solutions there is no evidence of synthesis, such as is obtained in the case of emulsin. It was thought that glycerin might serve as the medium. But this hope proved to be fallacious.

**Honey, Alkalinity of the Ash of.** H. Stout. (*Pharm. J.*, 1918, [4], 46, 147.) The original statement in the B.P., 1914, that the ash of honey should not be alkaline is erroneous. All the samples of honey examined, of Cuban, Californian, Irish, and Scotch origin, the last in the comb, gave an ash alkaline to litmus.

**Honey, Alkalinity of Ash of.** P. A. W. Self. (*Pharm. J.*, 1918, [4], 46, 167.) The author points out that he had previously called attention to the erroneous statement in the B.P., 1914, as to the non-alkalinity of the ash of honey. (*P.J.*, 1915, [4],

40, 384, 419, 420.) In later issues of the work the error has been corrected by the deletion of the word "not." No official intimation of this change appears to have been made to holders of the original issue.

**Inulin, Formation of, in Plants.** H. Colin. (*Comptes rend.*, 1918, 166, 224.) No trace of inulin is to be found in the parenchyma or other parts of the leaves of plants. It does not occur in the midrib or in the petiole. It is first met with in the stem and occurs in gradually increasing quantity downwards, reaching the maximum in the subterranean organs. In plants which produce tubercles, such as the Jerusalem artichoke and the dahlia, inulin is found in the greatest quantity in these organs in the young state. They contain less of the reducing agent than the stem. In plants, such as chicory, which have fleshy roots, but no tubercles, no inulin is found in any part of the leaves, but these are rich in a reducing agent. The whole of the inulin is found in the root. The theory that inulin is elaborated in the leaves and transferred thence to the root is, therefore, incorrect. The leaves form the sugars, from which inulin is elaborated by condensation as they traverse the stems, and when formed, inulin is concentrated in the roots or root-like organs.

**Isopyrum fumaroides, Cyanogenetic Glucoside in.** M. Mirandé. (*Comptes rend.*, 1917, 165, 717.) This Siberian Ranunculaceous plant, cultivated in the alpine garden at Lautaret, when bruised and macerated a few hours in water, liberates HCN, due to the action of an enzyme on a cyanogenetic glucoside. The amount formed in the month of August was 0.115 per cent. In 1913, the author found that the allied *Isopyrum thalictroides* also yielded HCN under like conditions, but only to the extent of 0.042 per cent. (See also Y.B., 1913, 225; 1914, 147; 1915, 187; 1916, 154, 224; 1917, 162.)

**Manna, Italian.** V. Raimondi. (*Boll. Chim. farm.*, 1918, 61, through *Répertoire*, 1918, 29, 180.) The three highest grades of manna in tears are that of Capaci from *Fraxinus ornus*, grown N.W. of Palermo; Geraci, from the same tree, grown east of Palermo; and Frassino or Castelbuono, from *Fraxinus excelsior*. Capaci tears give 62.15 per cent., of mannitol, Geraci 62 per cent., and Frassino 47 per cent. Each of the above kinds is also sent to the market in "sorts." These lower grades



give less mannitol. Capaci sorts contain 37 to 45 per cent.; Geraci sorts, 37 per cent.; and Castelbuono, 28 to 30 per cent. (See also *Y.B.*, 1917, 210.)

**Mannan in Coniferous Woods.** A. W. Schorger. (*J. Ind. Eng. Chem.*, 1917, 9, 748.) Mannan, which yields mannose on hydrolysis is present in all conifers, but has not been detected in woods of Angiosperms examined. The amount of the carbohydrate found in various species of pines varies from 1.5 to 9.2 per cent., but is usually about 5 or 6 per cent.; the quantity in the sapwood is generally larger than that in the heartwood. The presence of mannan in woods is of technical importance in the production of EtOH from sulphite liquor and by the hydrolysis of sawdust with catalysers.

**Raffinose, Distribution of.** H. E. Annett. (*Biochem. J.*, 1917, 11, 1-6, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2917.) Raffinose occurs in jute seeds, as well as in beet molasses, cotton seed, barley grains, wheat sprouts and eucalyptus manna. The sugar was obtained by finely grinding jute seed and exhausting with Et<sub>2</sub>O and gasoline. The residue was extracted with EtOH, and Et<sub>2</sub>O was then added to the EtOH extract, yielding a copious white precipitate. This was dissolved in hot 80 per cent. EtOH, filtered, and cooled. After several days rosettes of white needles were deposited. These were recrystallized from EtOH 80 per cent.

**Sambunigrin, Synthesis of.** E. Fischer and M. Bergmann. (*Berichte*, 1917, 50, 1047, through *J. Chem. Soc.*, 1918, 112, [1], 657.) Starting with racemic ethyl mandelate and acetobromoglucose, mandelonitrile glucoside and sambunigrin have been synthesized. Full experimental details are given. (See also *Y.B.*, 1906, 69; 1907, 143.)

**Sapotoxins, Detection and Estimation of, in Bread or Flour.** L. Stoecklin. (*Ann. Falsific.*, 1917, 10, 561, through *Analyst*, 1918, 43, 142.) Recent cases of poisoning in France are attributable to the presence of corn-cockle (*Agrostemma Githago*) in flour and bread. One sample of wheat examined by the author contained 19 per cent. of foreign seeds, including 10.2 per cent. of corn-cockle, and it is possible that contamination of wheat with the latter is not of rare occurrence. The injurious action of corn-cockle is due to the presence of a sapotoxin, and a quantity of 4 Gm. of corn-cockle seed, equivalent to 0.2

Gm. of sapotoxin, produces distinctly harmful effects on adults. Sapotoxin is best identified by means of its haemolytic action. The flour to be tested is extracted with  $\text{Et}_2\text{O}$  to remove oil, dried at  $100^\circ\text{C}$ . for 1 hour and then extracted at  $45^\circ\text{C}$ . for 45 minutes with 15 c.c. of sterilized 0.95 per cent.  $\text{NaCl}$  solution. The extract is filtered, and the filtrate is treated with 0.5 c.c. blood emulsion. The latter is prepared by shaking freshly-drawn ox blood with a small quantity of broken glass, separating the fibrin, mixing 25 c.c. of the liquid portion with 225 c.c. of 0.95 per cent. sterilized  $\text{NaCl}$  solution, and submitting this mixture to centrifugal action for 45 minutes. The liquid is then decanted, the sediment washed with a small quantity of  $\text{NaCl}$  solution, then diluted with 250 c.c. of the latter and well mixed. If sapotoxin is present, the turbid mixture becomes clear within a definite period according to the quantity of sapotoxin, but if the latter is absent, the mixture remains turbid; the corpuscles, however, settle out, leaving a colourless supernatant liquid. Under the same conditions as to temperature, nature of the blood emulsion, etc., the velocity of the haemolysis is proportional to the concentration of the sapotoxin, and the quantity of the latter present may therefore be determined by comparison with the action of a known quantity of pure sapotoxin (quillaia sapotoxin). The author has found that whenever a flour yielded an extract having a haemolytic action, the presence of corn-cockle debris could be detected microscopically. (See also *Y.B.*, 1911, 117.)

**Sedoheptose, a New Sugar from *Sedum Spectabile*.** F. B. La Forge and C. S. Hudson. (*J. Biol. Chem.*, 1917, 30, 61-77, through *Chem. Abst. Amer. Chem. Soc.*, 1917, 11, 1462.) An aqueous extract of the leaves and stalks of *Sedum spectabile* contains a free reducing sugar which is not fermentable with yeast and gives a strong reaction with orcinol and  $\text{HCl}$ . The sugar is a new heptose and is in all probability a ketose, as it is not oxidized by  $\text{Br}$ . When boiled with dilute acid it loses about 80 per cent. of its reducing power toward Fehling solution and its optical rotation is completely altered. It forms a phenylosazone at room temperature after a few hours, m.p.  $197^\circ\text{C}$ . A number of compounds and products of the new sugar are fully described.

**Soaps, Action of, on the Fermentative Degradation of Starch and Glycogen.** S. Kende. (*Biochem. Z.* 1917, 82, 9, through

*J. Chem. Soc.*, 112, [1], 615.) The soaps of the higher fatty acids inhibit the hydrolysis of starch and glycogen by diastase. Soap does not act directly on the enzyme, but on the substrate, with which it forms what is apparently an absorption compound. Soaps will not inhibit the hydrolysis of dextrins by diastase. The inhibitory action is annihilated by the presence of small quantities of acids. These results were observed in the course of an investigation on the inhibitory action of the expressed juice of pancreas on the action of diastase, which was proved to be due to the presence of soaps contained in this juice.

**Starch, Direct Method for Determination.** T. v. Fellenberg. (*Mitt. Lebensm. Hyg.*, 1916, 7, 369-83, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 663.) This gravimetric method depends on the solubility of starch in hot  $\text{CaCl}_2$  solution, its precipitation by I, and the decomposition of the precipitate by EtOH.

**Sugar, Determination of, in Baked Articles.** (*Journ. Soc. Chem. Ind.*, 1917, 36, 856.) The following is the method for the determination of the amount of sugar in baked articles as settled at a Conference between the Government Chemist and representatives of the Society of Public Analysts and of Biscuit Manufacturers:—

I.—PREPARATION OF SAMPLE. A. *Biscuits and similar articles in a fairly dry condition.* The whole sample, or a thoroughly representative portion of it, is rapidly ground in a mortar or by passing through a mincing machine. The powder is mixed and used for analysis.

B. *Large cakes in a moist condition or with an outside crust.* A slice, not less than  $\frac{1}{2}$  in. in thickness, is cut through the loaf, weighed and dried at a moderately low temperature to a moisture content of about 10 per cent., when it can easily be ground. It is weighed again, ground, and mixed, and the powder used for analysis.

C. *Buns and small cakes in a moist condition.* Several buns or cakes are taken, weighed, broken into coarse pieces and dried at a low temperature to a moisture content of about 10 per cent. The weight is again taken, the pieces ground, and the powder mixed, and used for analysis.

D. *Articles containing fruit (raisins, currants, dates, etc.) in which sugar naturally occurs.* A representative portion of the sample is weighed, broken rapidly on a sheet of paper, and the

fruit removed and weighed. The drying of the cake from which the fruit has been removed is continued as under "B" or "C" and the fruit is reserved for the determination of the sugar.

II. ANALYSIS. 1. *Moisture*. A portion, about 5 Gm., is weighed out from the prepared sample, and dried at  $100^{\circ}\text{C}$ . until the weight is constant. The loss in weight is corrected for the total loss in those cases in which preliminary drying previous to grinding has been carried out, and if fruit has been removed, to the original cake containing fruit.

2. *Sugars*. 10 Gm. of the prepared sample is ground up with water in a mortar, and transferred to a 250 c.c. flask, using in all about 200 c.c. of cold water. The flask is shaken at intervals during 30 minutes. The solution in the case of some articles, for example, certain kinds of biscuits, does not need a clearing agent. If it is necessary to use a clearing agent, basic lead acetate followed by  $\text{Na}_2\text{SO}_4$  to remove excess of Pb, or alumina cream, or  $\text{CuSO}_4$  solution may be employed. The liquid in the flask is then made up to 250 c.c., filtered, and the sugars determined in the filtrate. Fifty c.c. of the filtrate is measured into a 100 c.c. flask and inverted as follows: 5 c.c. of 38.8 per cent. HCl is added and the flask placed in a water-bath maintained at  $70^{\circ}\text{C}$ . The solution should reach a temperature of  $67^{\circ}$  to  $69^{\circ}\text{C}$ . in  $2\frac{1}{2}$  to 3 minutes. It is maintained at  $69^{\circ}\text{C}$ . for 7 to  $7\frac{1}{2}$  minutes, the total period of heating being  $10\frac{1}{2}$  minutes. It is then rapidly cooled, neutralized, made up to 100 c.c. and filtered. The reducing sugar in the filtrate is determined either by gravimetric or volumetric means, the total Cu-reducing power being calculated as cane sugar.

The quantity of "cane sugar" obtained is corrected to the original moisture of the sample and, if fruit has been removed, to the cake containing fruit. From the total quantity thus found, the sugar derived from added fruit in the case of fruit cakes is to be deducted. This is estimated by determining the amount of sugar in the fruit removed from the cake, and the loss in sugar it has sustained, on the basis of the following average amounts of sugar in natural dried fruits, calculated on the *water-free* samples:—

	Total reducing Sugars as Sucrose.
Raisins . . . . .	80
Currants . . . . .	80
Figs . . . . .	70
Dates (without stones) . . . . .	70



A deduction of 3 per cent. (3 units) is made from the total amount obtained, for sugars naturally present in flour or derived from flour in course of baking. To provide for variations in sampling, in methods of analysis, and in the amount of sugar in the different materials employed, an allowance of 2 per cent. (2 units) is made. (*Note*.—In the case of samples which have been prepared from ingredients containing active malt flour or extract this method is not applicable.)

**Sugar Determination with Fehling's Solution, Method for Detecting End-Point.** T. L. Woodruff. (*Chemist-Analyst*, 1917, [22], 14.) The following method is particularly applicable to the determination of sugars in syrups containing either reducing or non-reducing sugars, or both.

*To Determine a Reducing Sugar*.—If the sample is concentrated enough to be viscid, 10 c.c. or 14 Gm. is a convenient quantity of sample to use. Dilute with sufficient water to make 100 c.c., filter if necessary and transfer to burette. Place 50 c.c. of standard Fehling's solution in a porcelain dish, dilute somewhat, heat to boiling and boil for a short time. Now add the sugar solution from the burette, keeping the mixture boiling gently. Add the sugar solution until the blue colour begins to fade. The end-point is determined as follows: Select a grade of filter paper which does not allow water to spread too rapidly when dropped upon it. Place the paper on some support so that the centre of the paper does not touch anything. A round paper 5 inches in diameter placed on a beaker or dish 4 inches in diameter so that all but the outer edge of the paper is free is a convenient size. Put about 0.1 Gm. of small crystals of  $K_4FeCy_6$  in the centre of the paper. By means of a glass rod, add water to the crystals a drop at a time until the solution spreads to a circle of about 2 inches in diameter. Now remove a drop of the mixture from the dish with a rod and touch the paper where it is dry, so that when the drop spreads it barely touches the  $K_4FeCy_6$  solution. As long as there is Cu in solution a brownish-red line forms where the two solutions meet. As the titration is continued and the amount of Cu in solution decreases, the brown line gets fainter and finally fails to appear. Toward the end the colour is a little slow in developing so that the titration must not be carried on too rapidly.

*To Determine a Non-reducing Sugar*.—Use another portion of the sample (about same quantity as before), dilute with 50 c.c.

of water and add 25 c.c. of 10 per cent.  $\text{H}_2\text{SO}_4$ . Heat on steam or water bath for 1 hour, cool and make up to 100 c.c. Filter into burette. It is not necessary to neutralize the free acid in this last solution if enough alkali is added to the Fehling's solution in the dish to maintain the proper alkalinity. Otherwise the titration is carried out as before. The difference between the two titrations represents the non-reducing sugar.

**Sugars, Aldehydic, New Method for Determining.** J. Bougault. (*J. Pharm. Chim.*, 1917, **16**, 97.) Aldehydic sugars are quantitatively oxidized by I, according to the general equation,  $\text{R}\cdot\text{CHO} + \text{I}_2 + \text{H}_2\text{O} = \text{RCOOH} + 2\text{HI}$ . The reaction serves, therefore, to determine the molecular weight of a pure sugar or, when the molecular weight is known, to determine the quantity of the sugar present. This reaction is accompanied by another of minor importance, due to a slow oxidation of the alcohol function of the molecule. For this the appropriate correction must be made. This requires several titrations to be made at equal intervals of time. However, by comparative titration with a specimen of the pure sugar, one titration becomes sufficient. Ketonic sugars are not sensibly oxidized by I. The slight absorption of I is due in this case to the secondary reaction noted with aldehydic sugars. The method, therefore, permits of the determination of aldehydic in the presence of ketone sugars. Non-reducing sugars, such as sucrose and trehalose, behave towards I like those of the ketonic group. In mixtures of aldehydic sugars with sucrose or similar non-reducing sugars the precision of the method depends on the relative proportion of sugars present. In presence of a large excess of non-reducing sugar the results obtained are less accurate. The main obstacle to the general application of the method is the number of other organic substances which interfere with the reaction.

## GUMS, OLEORESINS, AND RESINS

**Abietic Acids, Optical Isomerism of.** F. Schulz. (*Chem. Zeit.*, 1917, **41**, 666; *J. Chem. Soc.*, 1917, **112**, i, 649.) Abietic acid may be prepared by extracting American colophony with dilute EtOH or by precipitating the EtOH solution with HCl, but whereas the EtOH solution of the resin is dextro-rotatory, the solution becomes laevorotatory on addition of HCl so that the products above mentioned are probably not identical. When

the resin is dissolved in boiling EtOH and dry HCl passed into the cold solution, white crystals of abietic acid are obtained, the constants of which gradually alter on recrystallization from acetone, from  $[\alpha]_D - 77.9^\circ$  and m.p.  $161^\circ \text{C.}$  to  $[\alpha]_D - 96.8^\circ$ , m.p.  $171^\circ \text{C.}$  Further recrystallization from acetone raises the m.p. to  $173^\circ \text{C.}$  The molecular weight by titration is found to be 304. On exposure to air, the  $[\alpha]_D$  alters owing to oxidation, and it changes also on heating at  $200^\circ \text{C.}$  American colophony, type H, extracted with dilute EtOH, yields an oil which gradually sets to a mass of crystals, from which by crystallization from acetone a portion is obtained having  $[\alpha]_D - 22^\circ$ , whilst another part has  $[\alpha]_D + 49^\circ$ . An almost inactive fraction,  $[\alpha]_D + 2.6^\circ$ , is also obtained. On treatment with mineral acid, the rotation of the two last became negative. From technical rosin oil the author has extracted an acid which he names oilsylvic acid, m.p.  $171^\circ - 173^\circ \text{C.}$ ,  $[\alpha]_D + 53^\circ$ , which does not alter in rotation when warmed with mineral acids, and in contradistinction to the abietic acid from colophony does not absorb oxygen from the air and does not turn yellow in light. The abietic acids can readily be esterified by boiling their EtOH solutions with 30 per cent. of strong  $\text{H}_2\text{SO}_4$  for an hour.

**Datura Metelloides, Resins from.** C. H. Rogers. (*J. Amer. Pharm. Assoc.*, 1918, 7, 26.) The resins extracted from the drug by EtOH 50 per cent. are described. This strength of the solvent was selected since it is that of the U.S.P. *Tinct. Stramonii*. It is found to contain resin esters, alcohol resins and resenes, the resin esters amounting to 54.54 per cent. of the total  $\text{CHCl}_3$  soluble resin, acid resins to 33.33 per cent., resenes to 9.66 per cent., and alcohol resins to 1.84 per cent. The analytical characters of the portions separated by various solvents are detailed. No crystalline constituent appears to have been obtained, and no definite substance identified.

**Melaleuca uncinata, Resin of.** H. G. Smith. (*Chem. and Drugg.*, 1918, 90, 14.) In a communication to the Royal Society of New South Wales the author stated that the outer bark of *Melaleuca uncinata* contains 23 per cent. of an orange-brown, semi-transparent and very brittle resin. It is almost entirely soluble in EtOH, entirely soluble in  $\text{Et}_2\text{O}$  and EtOH, and very soluble in acetone. It is only slightly soluble in  $\text{CHCl}_3$  and  $\text{C}_6\text{H}_6$ , and turpentine has little action upon it even on boiling. The chief constituent is a resin acid, the formula of which is

$C_{17}H_{28}O_4$ . It melts at about  $148^{\circ}$ – $150^{\circ}$ , and in alcoholic solution gives a deep green colour and green precipitate with  $FeCl_3$ . The neutral bodies of the resin melt at about  $125^{\circ}$ – $130^{\circ}$ , are brittle, of a resinous nature, and do not give the green coloration with  $FeCl_3$ . The acetone solution of the resin makes a good lacquer for brass.

**Metanorrhoea usitata, Oleoresin of.** E. Benskin and A. Rodger. (*Indian Forest Records*, 1917, 6, 97, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 1127.) The tree is fairly abundant in Burma, and yields an oleoresin somewhat resembling that of the Japanese lacquer tree, *Rhus vernicifera*, although it is not so poisonous. It can be used for both indoor and outdoor varnishes: wood so treated is said to become proof against attack by teredoes, termites, and fungi. It is therefore used in non-fouling paints. It is an excellent application for surfaces that are subsequently to be coated with gold leaf. Its chief use is for Burmese lacquer. Details are given of its method of preparation.

**Pinus cembra, Resin of.** M. Bamberger and H. von Klimburg. (*Monatsh.*, 1917, 38, 457, through *J. Chem. Soc.*, 1918, 114, [1], 120.) The resin obtained from the stone pine, *Pinus cembra*, possesses an odour recalling vanillin, becomes reddened on exposure to light, and has m.p. about  $70^{\circ}$  C., acid number 127; and iodine number 112, but the value for the last is as low as 78.4 if the resin is previously purified by dissolving in EtOH and pouring into water acidified with HCl; the methoxyl content is lower than in other natural resins, amounting only to 13 parts per 1000. Boiling water extracts from the resin caffeic acid and also small quantities of ferulic acid and vanillin, whilst the residual molten resin on fusion with KOH yields *p*-hydroxybenzoic acid, catechol, protocatechuic acid, acetic acid, and a trace of butyric acid. As with the resins investigated earlier, stone pine resin, after extraction with water, can be separated into an  $\alpha$ -resin soluble in  $Et_2O$  and a  $\beta$ -resin insoluble in the same solvent, the  $\alpha$ -resin, which has a much lower methoxyl content than the  $\beta$ -resin, predominating. Attempts to produce a resinol analogous to pinoresinol or lariciresinol were unsuccessful.

**Spruce Turpentine as a Source of Toluol.** A. S. Wheeler. (*J. Ind. Eng. Chem.*, 1918, 10, 359.) Spruce turpentine is a



by-product of the sulphite process of paper making from spruce wood pulp. It consists mainly of cymol. Boedtker and Halse have previously shown that it yields toluol when heated with  $C_6H_6$  and  $AlCl_3$ . The author confirms this and shows that the turpentine is capable of yielding a good product of toluol on the commercial scale. It simultaneously yields cumol, in the same reaction. This can be oxidized directly into benzoic acid.

**Storax, American, from *Liquidambar styraciflua* as a Substitute for Oriental Storax.** S. J o r d a n. (*J. Ind. Eng. Chem.*, 1917, **9**, 770.) The liquid or semi-liquid balsam from *Liquidambar styraciflua* is known in U.S.A. as "sweet gum." A sample had the following characters: Volatile matter, 22.37; ash, 0.32; insoluble in  $Et_2O$ , 5.24; insoluble in EtOH, 6.64; cinnamein, 22.86; resin esters, 34.76; resin acids, 2.11; free cinnamic acid, 12.63; total cinnamic acid, 28.02 per cent.; acid value, 68.7; and saponif. value, 131.6. Samples of Oriental storax, from *Liquidambar orientale*, examined had the following characters: Volatile matter, 20.35 to 27.64; ash, 0.28 to 4.48; insoluble in  $Et_2O$ , 2.16 to 7.12; insoluble in EtOH, 3.25 to 7.98; cinnamein, 25.89 to 54.90; resin esters, 1.00 to 24.24; resin acids, 2.63 to 53.35; free cinnamic acid, 1.87 to 8.14 per cent.; acid value, 42.2 to 100.4; and saponif. value, 133.0 to 166.2. The experiments showed that "sweet gum" is a satisfactory substitute for commercial storax, that it contains more cinnamic acid, and has a superior odour to that of the imported article. The Southern part of the United States would be able to supply all the U.S. requirements for storax.

**Storax, Examination of.** L. v a n I t a l l i e and H. J. L e m k e s. (*Pharm. Weekblad*, 1918, **55**, 142, through *J. Soc. Chem. Ind.*, 1918, **37**, 257A.) The determination of the cinnamic acid content is preferred to the acid or saponification values; the acid occurs in storax in the free state and as the cinnamyl, phenylpropyl, ethyl, and ricinoleic esters. The results of the examination of nine samples of storax are given. The free cinnamic acid cannot be determined from the acid value, which includes acids insoluble in water; moreover, if hydrolysis occurs, a high acid value results. Titration of the aqueous extract with alkali gives a much lower content of cinnamic acid than the following bromine method, which is recommended by the authors. 1 Gm. of the sample is boiled with 20 c.c. of N/2 alcoholic KOH

for 1 hour under a reflux condenser, the mixture distilled on a water-bath, and the residue dissolved in 25 c.c. of water. The solution is extracted with 20 c.c. of  $\text{Et}_2\text{O}$ , and the aqueous layer, together with two 5 c.c. portions of water used for washing the  $\text{Et}_2\text{O}$  layer, diluted to about 950 c.c., treated with 10 c.c. of dilute  $\text{H}_2\text{SO}_4$ , made up to 1000 c.c., and filtered. 100 c.c. of the filtrate is treated with 10 c.c. of  $\text{N}/10 \text{ KBrO}_3$ , 1 Gm. of  $\text{KBrO}_3$ , and 5 c.c. of  $\text{H}_2\text{SO}_4$ ; after 15 minutes, 1 Gm. of  $\text{KI}$  is added, and then after a further 5 minutes the liberated  $\text{I}$  is titrated with  $\text{Na}_2\text{S}_2\text{O}_3$ : 1 c.c. of  $\text{N}/10 \text{ KBrO}_3$  is equivalent to 7.4 Mgm. of cinnamic acid. (See also *Y.B.*, 1911, 141; 1912, 146; 1913, 158; 1917, 96.)

## INORGANIC CHEMISTRY

**Aluminium and Fe, Separation of, by means of  $\text{Et}_2\text{O}$ .** S. Palkin. (*J. Ind. Eng. Chem.*, 1917, 9, 951.) Evaporate the mixed solution of  $\text{AlCl}_3$  and  $\text{FeCl}_3$  (not more than 5 Gm. total) to dryness in a 50 c.c. Erlenmeyer on the steam bath, then continue the drying in an oven at  $120^\circ \text{C}$ . for half an hour, stirring occasionally. Moisten the residue with 0.5 to 1 c.c. of a 25 per cent. solution of  $\text{HCl}$  in absolute  $\text{EtOH}$ , warm it on the steam bath and add 3 or 4 c.c. of absolute  $\text{EtOH}$  to get all salts into solution. Continue the warming until crystallization of the salts begins, then add 0.5 c.c. of the alcoholic  $\text{HCl}$  to redissolve. Remove the flask from the bath, add gradually 30 c.c. U.S.P.  $\text{Et}_2\text{O}$  sp.g. 0.715 to bring down hydrated  $\text{AlCl}_3$  and then 40 c.c. of absolute  $\text{Et}_2\text{O}$ . Filter on to a Gooch and wash while filtering with a solution of 100 parts of absolute  $\text{Et}_2\text{O}$  and 2 parts of alcoholic  $\text{HCl}$  to prevent  $\text{FeCl}_3$  from drying on the precipitate or filter. To the  $\text{AlCl}_3$  solution made up to 100 c.c. add 5 Gm. of  $\text{NH}_4\text{NO}_3$ , make just alkaline with  $\text{NH}_4\text{OH}$  and determine  $\text{Al}$  as usual except that the precipitate should be ignited in a covered crucible. Distil the  $\text{Et}_2\text{O}$  from the  $\text{FeCl}_3$  solution, transfer the residue to a Pt dish with a little water and  $\text{HCl}$ , evaporate to dryness, add 1 c.c. strong  $\text{H}_2\text{SO}_4$ , and ignite to  $\text{Fe}_2\text{O}_3$ .

**Antimony Sulphides, Determination of Sulphide Sulphur in.** M. S. Bailey. (*Chem. Analyst*, 1917, [22], 6.) Dissolve 0.25 Gm. of antimony sulphide in 5 c.c. of  $\text{N}/5 \text{ NaOH}$ . When  $\text{Sb}$  colour has entirely disappeared, dilute to about 100 c.c. with dis-

tilled water, add 5 Gm. of NaCl and boil for a few minutes. Filter and wash well with hot water. Add an excess of 3 per cent.  $\text{H}_2\text{O}_2$  (about 50 c.c.). Make slightly acid with HCl. If an  $\text{Sb}_2\text{S}_3$  precipitate is formed, it indicates that enough  $\text{H}_2\text{O}_2$  has not been added and the S has not been entirely oxidized. This, however, can be remedied by making the solution alkaline with NaOH and adding more  $\text{H}_2\text{O}_2$  and again acidifying with HCl. If an  $\text{Sb}_2\text{S}_3$  precipitate is again formed, this process must be repeated. If a precipitate of another kind is formed, this must be filtered off. To boiling filtrate add slowly 10 c.c. of N/5  $\text{BaCl}_2$ . Continue boiling for a few minutes and keep hot until precipitate settles. Filter hot on an ashless filter paper, wash extra well with hot water to make sure that all Sb salts pass into solution. Ignite and weigh  $\text{BaSO}_4$  precipitate. Calculate percentage S. This S includes sulphide S, free S and  $\text{CaSO}_4$ . The percentage of free S and  $\text{CaSO}_4$  may be determined by well-known methods and these be subtracted from the total, and the remainder is sulphide S. If the percentage of Sb is known, the amount of  $\text{Sb}_2\text{S}_3$  and  $\text{Sb}_2\text{S}_5$  may be calculated as follows :

If X = percentage Sb and Y = percentage sulphide S,

Then percentage  $\text{Sb}_2\text{S}_3 = 3.501 \text{ X} - 5.249 \text{ Y}$

and percentage  $\text{Sb}_2\text{S}_5 = 6.249 \text{ Y} - 2.501 \text{ X}$ .

**Antimony Tri-iodide, New Form of.** A. C. Vournasos. (*Comptes rend.*, 1918, **166**, 526.)  $\text{SbI}_3$  is already known to occur in three crystalline forms, hexagonal, orthorhombic and clinorhombic. The two latter are converted into the former by heating to  $120\text{--}125^\circ \text{C}$ . when they form ruby red hexagons. The author finds that anhydrous glycerin is one of the best solvents for  $\text{SbI}_3$ , in which it is soluble to the extent of 1 : 5 with heat. On cooling it is deposited in the new form, as an amorphous yellow precipitate of micro globules. After removing the glycerin by washing with acetic aldehyde the yellow powder is metastable. When heated to  $172^\circ$  it sublimes and assumes the form of the stable red hexagons. Analysis and reactions prove that it has the formula  $\text{SbI}_3$  in common with the three known crystalline forms.

**Bromides and Iodides, Argentometric Determination of.** I. M. Kolthoff. (*Pharm. Weekblad*, 1917, **54**, 761.) Attempts to determine Br in presence of Cl in acid ( $\text{HNO}_3$ ) solution, with  $\text{Fe}(\text{CNS})_3$  as indicator, showed that while the method is very

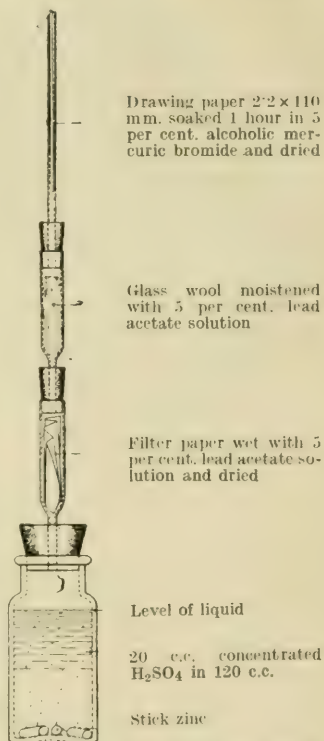
accurate with Br alone, small amounts of Cl cause serious error. This is due to the different solubility and ion concentration of AgCl, AgBr and AgCNS. Experiments to find the most favourable concentration of ferric ammonium alum to give maximum coloration with 0.2 c.c. of N/10 thiocyanate per 100 c.c., using 10 c.c. of N/4  $\text{HNO}_3$  per 100 c.c., showed that 1 c.c. of the saturated alum solution per 100 c.c. is necessary and sufficient to give a deep red colour. The disturbing effect of Cl is decreased by using enough indicator to give a deep colour, taking as the end point the first marked decrease in intensity. But even thus, the titration is not reliable if the Cl concentration is more than 4 per cent. This method cannot be used for iodides, since in acid solution the indicator liberates I. Starch iodide can be used as indicator in titrating I with  $\text{AgNO}_3$ ; and the Cl concentration may be as high as 20 per cent. without affecting the accuracy. The Br concentration must not exceed 3 per cent. The solution for this titration is acidified with  $\text{H}_2\text{SO}_4$  instead of  $\text{HNO}_3$ . This method is well adapted to the I determinations in the Dutch Pharmacopoeia. (See also *Y.B.*, 1916, 170; 1906, 16; and *Gen. Index*.)

**Arsenic in American Hops.** W. W. Stockberger and W. D. Collins. (*U.S. Depart. Agric.*, 1915 [568].) Certain shipments of American hops having been refused in Europe on account of contamination with As, investigation was undertaken to trace this to its source. Sun-dried hops were found to be As free. The spraying materials in general use, such as solutions of whale-oil soap and quassia or nicotine sulphate are not to be held responsible for the contamination of hops with arsenic. The S in use in kiln drying hops in 1914 and 1915 was generally contaminated with As, many samples containing over 100 parts of As as  $\text{As}_2\text{O}_3$  in 1,000,000 parts of S. When such S is used in curing hops, the hops may contain three or four parts of  $\text{As}_2\text{O}_3$  per million parts of hops. Little, if any, doubt remains that impure S alone is responsible for the contamination of hops with appreciable quantities of As. The amount of As, in terms of  $\text{As}_2\text{O}_3$  per million found in the contaminated hops ranged from 0.2 to 26. In the samples of contaminated S examined the amount of  $\text{As}_2\text{O}_3$  ranged from 3.6 to 460 parts per million. The parcels of S supplied to growers are far from uniform in quantity, and the As is not at all evenly distributed in any particular bulk.



**Arsenic in Sulphured Food Products.** W. D. Collins. (*J. Ind. Eng. Chem.*, 1918, 10, 360.) Minute details are given of the method of applying Smith's colorimetric modification of the familiar Gutzeit reaction, and of precautions necessary to avoid contamination of the test with traces of As derived from reagents or apparatus, and methods are given for freeing the reagents employed from traces of As. The modified Gutzeit's apparatus figured is recommended.

The sensitized strips of drawing paper, 11 cm. long by 2.0 or 2.5 mm. wide, are prepared by soaking for 1 hour in a 5 per cent. alcoholic solution of  $\text{HgBr}_2$ . The excess solution is wiped off and the strips dried in glass rods. For the details of the process, the original paper should be consulted. It is shown that food products treated with arsenical sulphur for bleaching or curing are liable to receive a serious contamination with As. (See also *Y.B.*, 1904, 30, 33; 1905, 25, 36, 38; 1906, 10; 1912, 161; 1917, 97; and *Gen. Index.*)



APPARATUS FOR THE GUTZEIT TEST  
AS MODIFIED BY C. R. SMITH.

#### Atomic Weights, International, 1918. (*Analyst*, 1918, 43,

1.) Aluminium (Al), 27.1; Antimony (Sb), 120.2; Argon (A), 39.88; Arsenic (As), 74.96; Barium (Ba), 137.37; Bismuth (Bi), 208.0; Boron (B), 11.0; Bromine (Br), 79.92; Cadmium (Cd), 112.40; Caesium (Cs), 132.81; Calcium (Ca), 40.07; Carbon (C), 12.005; Cerium (Ce), 140.25; Chlorine (Cl), 35.46; Chromium (Cr), 52.0; Cobalt (Co), 58.97; Columbium (Cb), 93.1; Copper (Cu), 63.57; Dysprosium (Dy), 162.5; Erbium (Er), 167.7; Europium (Eu), 152.0; Fluorine (F), 19.0; Gadolinium (Gd), 157.3; Gallium (Ga), 69.9; Germanium (Ge), 72.5; Glucinum (Gl), 9.1; Gold (Au), 197.2; Helium (He),

4.00 ; Holmium (Ho), 163.5 ; Hydrogen (H), 1.008 ; Indium (In), 114.8 ; Iodine (I), 126.92 ; Iridium (Ir), 193.1 ; Iron (Fe), 55.84 ; Krypton (Kr), 82.92 ; Lanthanum (La), 139.0 ; Lead (Pb), 207.20 ; Lithium (Li), 6.94 ; Lutecium (Lu), 175.0 ; Magnesium (Mg), 24.32 ; Manganese (Mn), 54.93 ; Mercury (Hg), 200.6 ; Molybdenum (Mo), 96.0 ; Neodymium (Nd), 144.3 ; Neon (Ne), 20.2 ; Nickel (Ni), 58.68 ; Niton (radium emanation) (Nt), 222.4 ; Nitrogen (N), 14.01 ; Osmium (Os), 190.9 ; Oxygen (O), 16.00 ; Palladium (Pd), 106.7 ; Phosphorus (P), 31.04 ; Platinum (Pt), 195.2 ; Potassium (K), 39.10 ; Praseodymium (Pr), 140.9 ; Radium (Ra), 226.0 ; Rhodium (Rh), 102.9 ; Rubidium (Rb), 85.45 ; Ruthenium (Ru), 101.7 ; Samarium (Sa), 150.4 ; Scandium (Sc), 44.1 ; Selenium (Se), 79.2 ; Silicon (Si), 28.3 ; Silver (Ag), 107.88 ; Sodium (Na), 23.00 ; Strontium (Sr), 87.63 ; Sulphur (S), 32.06 ; Tantalum (Ta), 181.5 ; Tellurium (Te), 127.5 ; Terbium (Tb), 159.2 ; Thallium (Tl), 204.0 ; Thorium (Th), 232.4 ; Thulium (Tm), 168.5 ; Tin (Sn), 118.7 ; Titanium (Ti), 48.1 ; Tungsten (W), 184.0 ; Uranium (U), 238.2 ; Vanadium (V), 51.0 ; Xenon (Xe), 130.2 ; Ytterbium (Neoytterbium) (Yb), 173.5 ; Yttrium (Yt), 88.7 ; Zinc (Zn), 65.37 ; Zirconium (Zr), 90.6. (See also *Y.B.*, 1917, 167.)

**Bismuth Subnitrate, Determination of Nitric Acid in.** E. Luce. (*J. Pharm. Chim.*, 1918, 17, 349.) The method is based on the reaction between  $\text{HNO}_3$  and  $\text{H}_2\text{C}_2\text{O}_4$  according to the equation  $6(\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}) + 2\text{HNO}_3 = 2\text{NO} + 9\text{CO}_2 + 19\text{H}_2\text{O} + 3\text{CO}$ ; or, in the case of  $\text{BiONO}_3$  in presence of  $\text{H}_2\text{SO}_4$   $6(\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}) + 2\text{BiONO}_3 + \text{H}_2\text{SO}_4 = 2\text{NO} + 3\text{CO} + 9\text{CO}_2 + 19\text{H}_2\text{O} + (\text{BiO})_2\text{SO}_4$ . It will thus be seen that 1 mol.  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O} = 1$  mol.  $\text{HNO}_3$ . The solutions necessary for the determination are: (1) A solution of  $\text{KMnO}_4$  20 Gm. in 1 litre. This is best prepared by treating the salt in a porcelain dish with successive portions of warm water, straining through glass wool, until all the crystals are dissolved. The very dark colour of the solution renders it difficult to perceive if solution is complete if the salt is merely added to a larger volume of water. When cold, the solution is adjusted to the definite volume, then set against pure  $\text{Am}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$  in presence of  $\text{H}_2\text{SO}_4$ , heating the solution gently before running in the  $\text{KMnO}_4$ . A solution of  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ , 20 Gm.;  $\text{H}_2\text{SO}_4$ , 60 c.c.; made up to 500 c.c. with water. The  $\text{H}_2\text{SO}_4$  is added to 300 c.c. of water;

the  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  is dissolved therein and the volume of the cold solution adjusted. This is then set against the standard  $\text{KMnO}_4$ , the titration being made at  $60-80^\circ$ . The determination of the  $\text{HNO}_3$  in  $\text{BiONO}_3$  is performed thus: About 0.5 Gm. of  $\text{BiONO}_3$  is introduced into a 300 cc. flask with a fairly wide mouth: 1 Gm. of  $\text{MnSO}_4$  is added and 50 c.c. of the standard  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  solution. The flask is fitted with a rubber cork with two holes, by means of one of which it is connected up with a  $\text{CO}_2$  generator, the delivery tube reaching to 1 cm. above the surface of the liquid. The other aperture is fitted to an upright condenser. A slow current of  $\text{CO}_2$  is started and the flask is warmed on the water bath. When the temperature of the mixture reaches  $90-95^\circ$ , reaction commences and lasts for an hour or 90 minutes. When all evolution of gas ceases, the liquid is allowed to cool, and the cold liquid is transferred to a graduated 100 c.c. flask and made up to that volume. Finally the liquid is filtered. Fifty c.c. of the filtrate is then titrated with the standard  $\text{KMnO}_4$  solution. If  $n$  = the volume of the  $\text{H}_2\text{C}_2\text{O}_4$  originally added and  $n^1$  = the amount of  $\text{KMnO}_4$  used up and  $a$  the titre of the  $\text{KMnO}_4$  solution, then the amount of  $\text{HNO}_3$  found =  $(n - n^1) \times a \times 2 \times \frac{1}{6}$ .

**Boric Acid, Determination of, by Ignition.** C. R. B a g s h a w (*Analyst*, 1918, **43**, 137.) Owing to the shortage of glycerol, experiments were carried out on the determination of  $\text{H}_3\text{BO}_3$  in the powder and ointment by means of ignition, and calculation from the remaining  $\text{B}_2\text{O}_3$ . According to Mellor (*Modern Inorganic Chemistry*, p. 626),  $\text{B}_2\text{O}_3$  "volatilizes extremely slowly at a red heat." and, according to Thorpe (*Dictionary of Applied Chemistry*, vol. i, p. 499), it is "non-volatile." Theory requires the percentage of  $\text{B}_2\text{O}_3$  obtained from the ignition of  $\text{H}_3\text{BO}_3$  to be 56.4, and therefore results obtained by this method, multiplied by 100/56.4, should give the percentage of boric acid present. The results obtained by this method were, however, not satisfactory, as results from the samples ignited slowly varied from 53.7 per cent. to 55.1 per cent. of  $\text{B}_2\text{O}_3$ , and those ignited rapidly varied from 52.6 per cent. to 54.0 per cent. Ten Gm. of a sample of  $\text{H}_3\text{BO}_3$  ointment known to contain 10 per cent. of  $\text{H}_3\text{BO}_3$ , after igniting for 1 hour, gave a residue of 5.11 per cent. of  $\text{B}_2\text{O}_3$ , equal to 9.06 per cent. of  $\text{H}_3\text{BO}_3$ . This residue on further heating lost weight as follows: After further 2 hours 4.94 per cent.  $\text{B}_2\text{O}_3$  8.76 per cent.  $\text{H}_3\text{BO}_3$ ; after further

7 hours 4.50 per cent.  $B_2O_3$  7.98 per cent.  $H_3BO_3$ ; after further 10 hours 3.53 per cent.  $B_2O_3$  6.26 per cent.  $H_3BO_3$ ; after further 14 hours 2.39 per cent.  $B_2O_3$  4.24 per cent.  $H_3BO_3$ ; after further 17 hours 1.97 per cent.  $B_2O_3$  3.49 per cent.  $H_3BO_3$ . These experiments show that, where the ignition method is used, somewhat low results may be expected, even when the greatest care is taken during the ignition. Two Gm. of borax on ignition for 15 minutes gave a residue of 1.052 Gm., which weight remained constant on further heating for 5 hours.

**Boron, Effect of, on Crops.** F. C. C o o k and J. B. W i l s o n. (*Proc. Amer. Soc. Biol. Chem.*, Dec. 1917, 6, 171, through *J. Soc. Chem. Ind.*, 1918, 37, 274A.) The authors describe the effects of manure to which a proportion of borax or colemanite (calcium borate) has been added, on various crops grown in different parts of the U.S. The conclusion drawn is that the absorption by and the toxic effect of boron on plants varies with the variety of plants, the solubility of the boron compound, the amount of the boron compound added to the soil, the time elapsing after the compound is mixed with the soil before planting, the amount of rainfall, etc., and finally, with the character of the soil to which the boron compound is added. Thus, in some soils, 0.0044 per cent.  $H_3BO_3$  added as borax and 0.0058 per cent. added as colemanite had no injurious action on lettuce, spinach, and kale, whilst at another spot 5 miles distant, similar percentages in the soil resulted in a distinct diminution in the crops of these vegetables. Wheat, oats, and rye absorbed only a little boron, whilst leguminous and succulent plants absorbed comparatively large amounts and were adversely affected by relatively small traces of the boron compounds in the soil.

**Bromine, Commercial, Determination of Cl in.** E. W a l l e r. (*J. Ind. Eng. Chem.*, 1917, 8, 837.) Cl is the chief impurity in commercial Br. It may be determined in the following manner: 6 to 8 Gm. of the sample is weighed out in a small stoppered flask. This is then poured and rinsed into a 350 c.c. beaker containing about 70 c.c. of water. The object in using so large a beaker is to avoid loss when boiling out the Br. To this is then added, by means of a pipette, 20 or 25 c.c. of a solution of pure NaBr of 7 to 10 per cent. strength. At the same time, using the same pipette, the same amount of NaBr solution is pipetted into a weighed dish to serve as a blank. The



beaker containing the Br is placed on the boiling water bath, and allowed to remain there until the Br has all boiled off, and most or all of it has been expelled from the solution, when the solution of mixed bromide and chloride is transferred to another tared dish, and both that and the blank are evaporated to dryness, the last traces of moisture expelled by heating in air bath at about  $130^{\circ}$ , ignited gently and weighed. The salts obtained from the "mixed" is less than that from the "blank" by an amount equivalent to the difference between the combining weights of Cl and Br. In other words, Blank — Mixed = Diff., and since (Br) 79.92 — (Cl) 35.46 = 44.46

$$44.46 : 35.46 = \text{Diff.} : \text{Cl present}$$

For most purposes, 80 per cent. of the difference in weights give the Cl.

The contents of the dishes should be dissolved separately, and each diluted to some convenient bulk (say 250 c.c.), and aliquot portions tested by titration with standard  $\text{AgNO}_3$ . The halogen equivalent in the two masses of salts should be the same if no losses have occurred.

A sample of commercial Br was found by this method to contain 3.1 per cent. of Cl, and the "chemically pure" samples 0.19 per cent.

**Calcium, Detection of, in Presence of Ba and Sr.** Z. Karaglanow. (*Z. anal. Chem.*, 1917, **56**, 138–41, through *J. Chem. Soc.*, **112**, II, 333.) The test described depends on the insolubility of  $\text{CaF}_2$  and the relative solubility of  $\text{BaF}_2$  and  $\text{SrF}_2$ . One litre of water dissolves 16 Mgm. of  $\text{CaF}_2$ , 117 Mgm. of  $\text{SrF}_2$ , or 1630 Mgm. of  $\text{BaF}_2$ .  $\text{BaF}_2$  solution is used as the reagent. A distinct turbidity is produced when this solution is added to 10 c.c. of water containing 0.0008 Gm. of Ca (as  $\text{CaCl}_2$ ). The presence of  $\text{SrCl}_2$  or  $\text{NH}_4\text{Cl}$  in the  $\text{CaCl}_2$  solution does not affect the sensitiveness of the reaction, but it is decreased when  $\text{BaCl}_2$  is present.

**Calcium, Rapid Method for Determining as  $\text{CaSO}_4$ .** L. G. Willis. (*J. Ind. Eng. Chem.*, 1917, **9**, 1114.) The Ca is precipitated in the usual manner as  $\text{CaC}_2\text{O}_4$ . The precipitate is ashed in a tared crucible, and the residue again ignited after adding excess of a mixture of equal parts of  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{NH}_4\text{Cl}$ . The residue is weighed as  $\text{CaSO}_4$ .

**Calcium Glycerophosphate.** J. F. Couch. (*Amer. J. Pharm.*, 1917, **89**, 243.) Commercial calcium glycerophosphate

is a mixture of isomeric  $\alpha$ - and  $\beta$ -calcium glycerophosphates, the isomerism being that of substituted propyl and isopropyl groups. The solubility of the compound in water at 25° C. is 1 : 31.6, but is decreased by the presence of EtOH, glycerol, or of sodium glycerophosphate, the solubility in EtOH 12 per cent. is 1 in 66.6. Lactic, citric, and phosphoric acids, and sodium citrate increase the solubility even in the presence of EtOH or glycerin, but the compound undergoes hydrolysis by the action of the acids. EtOH and glycerin retard the hydrolysis, but the use of acids in order to increase the solubility of the compound is undesirable. Many compound mixtures of glycerophosphates contain quinine, and weak organic acids may produce an intramolecular change in the quinine with the production of quinotoxine. (See also *Y.B.*, 1914, 401.)

**Calcium Oxide, Method for the Determination of, in presence of  $\text{CaCO}_3$ .** N. Busvold. (*Tidskrift Kem. Farm. Terapi*, 1917, 14, 143, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 3196.) Slake 1 Gm. of the lime sample in a small amount of water in a 250 c.c. graduated flask and add 2 Gm.  $\text{NH}_4\text{Cl}$  dissolved in 150 c.c. 55 per cent.  $\text{CaCl}_2$  solution. After frequent stirring for 15 minutes add 2 portions of 0.5 Gm. of  $\text{NH}_4\text{Cl}$  1 minute apart during constant stirring. Dilute the contents of the flask to the mark with the 55 per cent.  $\text{CaCl}_2$  solution and titrate an aliquot of the clear liquid against N/5 HCl with methyl orange as indicator. (This method might be applied to the assay of *Liquor calcis*.—Ed. *Y.B.*)

**Calcium Phosphates and their Solubility in Citric Acid.** A. A. Ramsay. (*J. Agric. Sci.*, 1917, 8, 277, through *J. Chem. Soc.*, 1917, 112, [2], 413.) The substances commonly sold as "phosphate of lime" and "Calcii Phosphas B.P." are mixtures of di- and tri-calcium phosphates. The methods generally used for the preparation of calcium phosphate yield a mixture of di- and tri-calcium phosphates and calcium hydroxide. Pure  $\text{Ca}_3\text{P}_2\text{O}_4$  is obtained by acting on CaO with  $\text{P}_2\text{O}_5$  in the proportion of  $3\text{CaO} : 1\text{P}_2\text{O}_5$ , and separating the precipitate within an hour. So prepared, about 91 per cent. of the total  $\text{P}_2\text{O}_5$  is soluble in 2 per cent. citric acid, using the standard method for this determination. This solubility is reduced to 84.5 per cent. if 25 per cent. of  $\text{CaCO}_3$  is first added to the  $\text{Ca}_3\text{P}_2\text{O}_4$ . Further addition of another 25 per cent. of  $\text{CaCO}_3$  only reduces the solubility of the  $\text{P}_2\text{O}_5$  to 84.3 per cent. In this determin-

ation the whole of the excess of calcium is dissolved during the 30 minutes' extraction with the 2 per cent. citric acid. Since both  $\text{Ca}_3\text{PO}_4$  and  $\text{CaHPO}_4$  are soluble in the 2 per cent. citric acid solution, the method of differentiating between these two forms of phosphate by the selective action of this solvent is unsatisfactory.

**Carbon Dioxide, Apparatus for Determining.** — Baker. (*Amer. Drugg.*, 1918, **66**, 144.) The illustration depicts a new



simple apparatus for estimating  $\text{CO}_2$  in baking powders and similar mixtures. The apparatus is a hydrometer containing the sample to which  $\text{HCl}$  is added. The decrease in weight accompanying the consequent release of  $\text{CO}_2$  is recorded on a scale as the percentage of carbonates from which the gas escaped. The great advantage of this apparatus over similar apparatus is that no chemical balance is needed nor are there any calculations to be made.

#### **Chlorates and Hypochlorites, Determination of.**

E. Rupp. (*Z. anal. Chem.*, 1917, **56**, 580, through *J. Soc. Chem. Ind.*, 1918, **37**, 1205A.) A suitable quantity, e.g. 10 c.c. of a solution containing about 0.5 per cent. of  $\text{KClO}_3$  and  $\text{Ca}(\text{ClO})_2$ , is diluted to 100 c.c. in a large stoppered flask, 2 Gm. of  $\text{KI}$  is added, the solution is acidified with dilute  $\text{HC}_2\text{H}_3\text{O}_2$  and, after 5 minutes, titrated with  $\text{N}/10$  hypo; this titration gives the amount of hypochlorite. Another portion of 10 c.c. of the solution is treated in a stoppered flask with 1 Gm. of  $\text{KBr}$  and 30 c.c. of strong  $\text{HCl}$ ; after 15 minutes, 15.0 c.c. of 1 per cent.

$\text{KI}$  solution is added, the mixture is shaken, and titrated with  $\text{N}/10$  hypo. The difference between the two titrations is a measure of the amount of chlorate present.

#### **Chromates and Dichromates, Gravimetric Estimation of**

L. W. Winkler. (*Zeitsch. angew. Chem.*, 1918, **31**, 46, through *J. Chem. Soc.*, 1918, **114**, [II], 176.) I. As  $\text{BaCrO}_4$ .—One hundred c.c. of a neutral solution containing about 0.2 per cent. of an alkali chromate is treated with 1 c.c. of  $\text{N}/10\text{-HC}_2\text{H}_3\text{O}_2$  and 1 Gm. of  $\text{NaCl}$ , heated to boiling, and 5 c.c. of 1 : 10 solution of  $\text{BaCl}_2$  are added slowly while the mixture is stirred. The mixture is kept boiling for 3 minutes, then cooled, and, after 18

hours, the precipitate is collected, washed with 50 c.c. of cold water, dried at  $132^{\circ}\text{C}$ ., and weighed. When the precipitate weighs less than 0.1 Gm., the weight found is about 1 Mgm. too low. If the precipitate is ignited before being weighed, it loses 0.25 per cent. in weight. The presence of  $\text{NH}_3$ , K, Mg, and Ca chlorides does not interfere, but nitrates, chlorates, and acetates cause the results to be too high. Dichromates are estimated in a similar way after their solution has been boiled with the addition of  $\text{CaCO}_3$  and filtered. II. *As Ag<sub>2</sub>CrO<sub>4</sub>*.—This method must be used if the chromate solution contains sulphate; in any case, it is more trustworthy than the  $\text{BaCrO}_4$  method, but cannot be used in the presence of chlorides. One hundred c.c. of the chromate solution (or dichromate solution after treatment with  $\text{CaCO}_3$ ) is boiled and 5 c.c. of 1 : 10 solution of  $\text{AgNO}_3$  solution are added. After 18 hours, the precipitate is collected, washed with 50 c.c. of water saturated previously with  $\text{Ag}_2\text{CrO}_4$ , dried at  $132^{\circ}\text{C}$ . and weighed. The results are not affected by the presence of nitrates, chlorates, or acetates, but sulphates cause the results to be too high.

**Cobalt, Quantitative Separation of, from Ni.** A. Carnot. (*Bull. Soc. Chim.*, 1917, [iv], 21, 211, through *Analyst*, 1918, 43, 98.) The solution is treated with  $\text{AmCl}$ ,  $\text{AmOH}$  and  $\text{H}_2\text{O}_2$ , and warmed, with the result that the Co forms the compound  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ , Ni not forming a compound of this type. On neutralizing by means of acid, cooling, and adding excess of ammonium molybdate, the Co is precipitated as  $\text{Co}_2\text{O}_3 \cdot 10\text{NH}_3 \cdot 6\text{MoO}_3 + n\text{H}_2\text{O}$ . The precipitate, which is readily soluble in the least excess of  $\text{AmOH}$  and only slightly less soluble in very dilute acid, is washed with water, dried at  $110^{\circ}\text{C}$ ., and weighed as  $\text{Co}_2\text{O}_3 \cdot 10\text{NH}_3 \cdot 6\text{MoO}_3$ .

**Copper, Colorimetric Methods for Determining Small Quantities of.** R. F. Heath. (*Mining Sci. Press*, 1917, 114, 624, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 1938.) Where the Cu content of a mixture is below 0.05 per cent. the Cu may be determined as follows: Treat 1 to 10 Gm. of the sample, depending upon the amount of Cu probably present, with  $\text{HNO}_3$ ; boil until decomposed, add 5 c.c. of  $\text{H}_2\text{SO}_4$ , boil, filter, wash with 25 c.c. of warm water, precipitate the Cu from the filtrate with Al foil, collect the precipitated Cu, dissolve in dilute  $\text{HNO}_3$ , boil to expel NO, and evaporate to 10 c.c. if Cu is present only in small amounts. If present in larger quantity



dilute to 100 c.c. Into a Nessler cylinder pour 5 c.c. of 4 per cent.  $\text{K}_4\text{Fe}(\text{CN})_6$  solution, add 10 c.c. of the solution to be tested, dilute to 100 c.c. with water, and add 5 c.c. of 10 per cent.  $\text{NH}_4\text{NO}_3$  solution. In a second cylinder put 5 c.c. of the  $\text{K}_4\text{Fe}(\text{CN})_6$  solution, dilute to 80 c.c. with water, add 5 c.c. of the  $\text{NH}_4\text{NO}_3$  solution, and run in standard Cu solution from a burette until the colours match, and calculate the percentage of Cu in the sample from the number c.c. of standard required. To prepare the standard, dissolve 0.1 Gm. of Cu foil in 5 c.c. of  $\text{HNO}_3$ , add a few drops of  $\text{H}_2\text{SO}_4$ , evaporate to expel  $\text{NO}$ , add water, cool, and dilute to 1 litre. By using a standard solution of KCN and  $\text{NH}_4\text{OH}$ , Cu may be determined in the same manner as above. (See also *Y.B.*, 1907, 115; 1908, 62; 1912, 151, 152; 1913, 170; 1914, 113; 1915, 145; and *Gen. Index.*)

**Copper, Wide Distribution of Traces of, in Animal and Vegetable Foods.** P. Charles. (*Annales Chim. analyt.*, 1917, 22, 244.) The note on the presence of Cu in tomatoes (*Y.B.*, 1917, 101) induces the author to recall the fact that about 30 years ago he found that metal to be very widely distributed. His attention was at that time directed to the matter by a case of erroneously suspected Cu poisoning in which he had to subject the viscera to toxicological examination. The only indication of the presence of Cu in traces was in the liver. A control experiment with ox liver showed even more Cu than the human organ; even unweaned calf's liver gave more than the human organ, but less than that of the adult ox. Various cereals were then examined, and found to contain Cu, especially in the cortical portions. It was also found in exotic drugs, notably in cinchona barks. It is to be inferred, therefore, that its presence in tomatoes is not an exceptional circumstance. (See also *Y.B.*, 1912, 152.)

**Cream of Tartar, Determination of Lead in.** A. J. Jones. (*Chem. and Drugg.*, 1918, 90, 375.) The following methods yield accurate results for the determination of Pb in cream of tartar which contains Fe, Al,  $\text{Ca}_3\text{PO}_4$ , etc. *Direct method.*—Ten Gm. of the sample is dissolved in 10 c.c. of  $\text{HCl}$  (sp.g. 1.052) and 20 c.c. of water, the solution is boiled, filtered, and the insoluble portion washed with 40 c.c. of hot water. The filtrate is treated with a small crystal of KI, boiled, cooled, and the liberated I is removed by the addition of N/10 hypo solution, 3 drops being added in excess. After the addition of 4 c.c. of 2 per cent.

HCN solution and 16 c.c. of strong AmOH, the mixture is boiled until it becomes practically colourless, then cooled, and diluted to 100 c.c. Seventy-five c.c. of this solution is now diluted to 100 c.c.,  $\text{Na}_2\text{S}$  is added, and the coloration obtained compared with that of a standard prepared with the remaining 25 c.c. of the solution and containing a known amount of Pb together with proportionate quantities of the reagents used in the test solution. *Ignition method.*—Five Gm. of the sample is incinerated gently, the charred mass is digested with 50 c.c. of water, filtered, the insoluble portion washed, and ignited to a grey ash. This is treated with 4 c.c. of HCl, the solution diluted with 8 c.c. of water, boiled, filtered while hot, and the filter washed with 30 c.c. of boiling water. To the filtrate is added a crystal of KI, and, after boiling, the iodine is removed by the addition of N/10 hypo solution. The solution is then boiled with the addition of 2 c.c. of 2 per cent. HCN solution and a slight excess of AmOH, cooled, acidified with HCl, 5 c.c. of 20 per cent.  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$  solution is added, the mixture is rendered ammoniacal, diluted to 100 c.c., treated with  $\text{Na}_2\text{S}$ , and the coloration compared with a standard.

**Ferrum Redactum, Analysis of.** L. W. W i n k l e r. (*Zeitsch. angew. Chem.*, 1917, 30, i, 64, through *J. Chem. Soc.*, 1917, 112, [2], 511.) The quantity of Fe may be estimated approximately (within 0.5 per cent.) by simple ignition in contact with air. The increase in weight is due to the oxidation of the iron; 100 parts by weight of Fe give 142.9 parts of  $\text{Fe}_2\text{O}_3$ . (See also *Y.B.*, 1907, 453; 1914, 362; 1916, 360; and *Gen. Index*.)

**Ferrum Redactum, Estimation of Metallic Iron in.** A. E b e r h a r d. (*Arch. Pharm.*, 1917, 255, 357, through *J. Chem. Soc.*, 1918, 114, [2], 48.) Ferrum redactum used to be prepared by means of pure H at a not too high temperature. In recent years, however, impure H (containing CO) and higher temperatures have been employed, and these changes have so altered the quality and purity of the product that the old methods of estimating the Fe, particularly the iodometric methods, no longer yield trustworthy results. (See also *Y.B.*, 1907, 453; 1914, 362; 1916, 360; and *Gen. Index*.)

**Fuller's Earth for Chemical Separations.** A. S e i d e l l. (*J. Amer. Chem. Soc.*, 1918, 40, 313.) A comparison of the adsorptive capacities of thirty-six samples of fuller's earth

and other clays showed that English earth is superior to all American earths except one, the exact source of which could not be traced. American betonite also has a higher adsorptive power than English fuller's earth, but its exceptional powers of retaining water render it less suitable in practical use. The amount adsorbed, in the case of quinine sulphate and of methylene blue, increased with the time of contact but at a gradually diminishing rate. The amounts adsorbed continued to increase with the amount of excess present. Maxima were not observed either in the case of the time factor or of the concentration factor. In the case of both quinine sulphate and of methylene blue the free base only is adsorbed from the aqueous solution when brought in contact with fuller's earth. The acid component of each compound unites with calcium derived from the fuller's earth and remains in the aqueous solution. When equal amounts of quinine sulphate and methylene blue are simultaneously present in an aqueous solution shaken with fuller's earth, both compounds are adsorbed to approximately the same extent. The sum of the two components is about 25 per cent. greater than the amount of either adsorbed separately. When the same portion of fuller's earth is first shaken with methylene blue and then with quinine sulphate, a small amount of the latter compound is taken up and only a trace of the former liberated. When the procedure is reversed, considerably more methylene blue is adsorbed and a fairly large proportion of the quinine sulphate is displaced from its combination with the fuller's earth. The results show that under the special conditions of this experiment, fuller's earth exhibits a distinct preference for methylene blue. Dilution of the aqueous solution, in the case of quinine sulphate, does not diminish appreciably the amount adsorbed when the ratio of earth to alkaloid is approximately that required for complete adsorption. In the case of a ratio of earth which is insufficient for complete adsorption, dilution causes a distinct reduction in the amount adsorbed. Increase of acidity of the aqueous solution, likewise, does not diminish the amount of quinine adsorbed in case the ratio of earth is just sufficient for complete adsorption. With less earth than sufficient for complete adsorption a distinct reduction in the amount of adsorbed alkaloid follows an increase in acidity of the aqueous medium. EtOH diminishes the adsorption only in cases where the ratio of earth used is insufficient for complete removal of quinine or of methylene blue. The presence of quite large

amounts of cane sugar was found to exert no retarding influence on the adsorption of quinine sulphate. It appears that the adsorptive power of fuller's earth is exerted particularly towards certain compounds, characterized by distinct basicity and that in the case of salts, only the base unites with the fuller's earth. No marked selectivity was found in the case of the two compounds forming the basis of the present experiments. The amount adsorbed in a given time is a function of ratio of earth to adsorbable material and except with insufficient earth for complete adsorption, is independent of dilution, acidity or presence of non-adsorbable neutral material. (See also *Y.B.*, 1916, 1, 15, 232.)

**Hydrogen Peroxide, New Method for the Estimation of.** G. S. Jamieson. (*Amer. J. Sci.*, 1917, [iv], 44, 150, through *J. Chem. Soc.*, 1917, 112, [2], 500.) The method is based on the addition of a measured volume of  $\text{H}_2\text{O}_2$  solution to an alkaline solution containing an excess of standard  $\text{Na}_2\text{HAsO}_3$ . After 2 minutes, strong  $\text{HCl}$  is added to the solution, and the unchanged arsenite is titrated with a standard solution of  $\text{KIO}_3$  in the presence of  $\text{CHCl}_3$  as indicator. (See also *Y.B.*, 1917, 101.)

**Hydrogen Peroxide, Reactions of.** V. Macri. (*Boll. chim. farm.*, 1917, 56, 417, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 595.) While the reactions of  $(\text{NH}_4)_2\text{MoO}_4$  with  $\text{H}_3\text{PO}_4$  and  $\text{H}_2\text{O}_2$ , respectively, are sensitive and characteristic,  $\text{H}_2\text{O}_2$  prevents precipitation of  $\text{NH}_4$  phosphomolybdate, colouring the solution intense yellow. The reaction of  $\text{H}_2\text{O}_2$  and  $\text{CrO}_3$  is not inhibited by presence of  $\text{H}_2\text{S}$ , provided the  $\text{CrO}_3$  solution is poured into the  $\text{H}_2\text{O}_2$ - $\text{H}_2\text{S}$  solution.  $\text{H}_2\text{O}_2$  in the presence of  $\text{CaCl}_2$  and  $\text{NH}_4\text{OH}$  causes the formation of a white, gelatinous precipitate which increases with time and finally changes to an amorphous, heavy, pulverulent deposit; this precipitate is composed of  $\text{CaO}_2$  and is soluble in  $\text{AcOH}$  from which it is not reprecipitated by addition of  $\text{NH}_4\text{OH}$ .  $\text{H}_2\text{O}_2$  when evaporated in a Pt dish in the presence of  $\text{HCl}$ , causes formation of  $\text{H}_2\text{PtCl}_6$ .  $\text{H}_2\text{O}_2$  does not appreciably decompose  $\text{KMnO}_4$  in the presence of  $\text{HNO}_3$  (instead of  $\text{H}_2\text{SO}_4$ ,  $\text{HCl}$ ); decomposition, if it occurs, commences only after a considerable length of time (decomposition proceeds more rapidly as the amount of  $\text{KMnO}_4$  is increased). The amount of free acid (this method was only tested with  $\text{H}_2\text{SO}_4$ ) in a  $\text{H}_2\text{O}_2$  solution may be determined by adding a standard solution of  $\text{KMnO}_4$ , with constant agitation



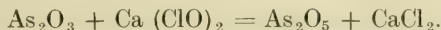
of the acid  $\text{H}_2\text{O}_2$  solution, until the latter assumes a brownish yellow colour. This determination is based on the fact that pure  $\text{H}_2\text{O}_2$  does not decompose  $\text{KMnO}_4$  and the amount of  $\text{KMnO}_4$  decomposed by an acid solution of  $\text{H}_2\text{O}_2$  is proportional to the amount of acid present. The content of acid may be calculated from the amount of  $\text{KMnO}_4$  consumed according to the equation:  $2\text{KMnO}_4 + 5\text{H}_2\text{O}_2 + 3\text{H}_2\text{SO}_4 = \text{K}_2\text{SO}_4 + 2\text{MnSO}_4 + 5\text{O}_2 + 8\text{H}_2\text{O}$ . If the amount of acid present is very small the change in colour is detected with difficulty. Addition of a small amount of  $\text{MgSO}_4$  renders the colour change more distinct. (See also *Y.B.*, 1916, 172.)

**Hydrogen Peroxide, Sensitive Reaction for.** G. Denigès. (*Annales Chim. analyt.*, 1917, 22, 193.) The reaction depends on the formation of oxytartaric acid by  $\text{H}_2\text{O}_2$  and  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$  in presence of a ferrous salt as catalyser. When this mixture is rendered alkaline, a violet colour is evident, due to the reaction of the oxytartaric acid with the trace of ferric salt generated. Two c.c. of a 1 : 20 solution of  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$  and 2 drops of 1 : 20 solution of  $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4$  are mixed; then 1 or 2 drops of  $\text{H}_2\text{O}_2$  solution of ordinary strength. After mixing 5 or 6 drops of  $\text{NaOH}$  solution are added. On again shaking, a violet colour is produced. The reaction may be obtained with a dilution containing 0.00004 or 0.00005 Gm. of O, by adding a large volume of the dilution.

**Hypobromite and Bromate, or Hypiodite and Iodate, Determination of, in Mixtures.** E. Rupp. (*Z. anal. Chem.*, 1918, 57, 16, through *J. Soc. Chem. Ind.*, 1918, 37, 205A.) The solution containing a hypobromite and bromate, or a hypiodite and iodate, is treated with  $\text{H}_2\text{O}_2$  and  $\text{NaOH}$  solution, the reaction proceeding according to the equation:  $\text{NaBrO} + \text{H}_2\text{O}_2 = \text{NaBr} + \text{H}_2\text{O} + \text{O}_2$ . The excess of  $\text{H}_2\text{O}_2$  is then destroyed by boiling the mixture,  $\text{KI}$  and  $\text{H}_2\text{SO}_4$  are added, and the liberated I is titrated with N/10 hypo solution. Another portion of the original solution is treated directly with  $\text{KI}$  and  $\text{H}_2\text{SO}_4$  and then titrated with N/10 hypo solution. The difference between the two titrations gives the quantity of hypobromite present, whilst the second titration gives the hypobromite and bromate together.

**Hypochlorites used in Surgical Antisepsis, Assay of.** R. C. Cowley. (*Australas. J. Pharm.*, 1917, 32, 388.) For the

determination of the available Cl in the various hypochlorite solutions used for surgical antiseptics alkaline N/10  $\text{As}_2\text{O}_3$  solution is recommended, using as an indicator paper moistened with starch water and KI. The reaction is substantially as follows :



The formulae of the various solutions employed are discussed. (See also *Y.B.*, 1917, 166.)

**Iodates, Determination of, in the Presence of Bromates.** E. Rupp. (*Z. anal. Chem.*, 1918, 57, 19, through *J. Soc. Chem. Ind.*, 1918, 37, 205A.) Bromates are converted gradually by dilute HCl into HBr and HClO is formed at the same time, but iodates are not affected. An aliquot portion of a solution containing an iodate and bromate is treated with KI and  $\text{H}_2\text{SO}_4$ , and, after a few minutes, the mixture is titrated with N/10 hypo solution ; this gives a measure of the iodate and bromate together. Another portion of the solution is diluted to 50 c.c., treated with 20 c.c. of 12.5 per cent. HCl, placed aside for 1 hour, 25 c.c. of 3 per cent.  $\text{H}_2\text{O}_2$  and 15 c.c. of 15 per cent. NaOH solution are then added, the mixture is boiled for 10 minutes, cooled, KI and  $\text{H}_2\text{SO}_4$  are added, and the liberated I is titrated with N/10 hypo. The difference between the two titrations corresponds with the amount of bromate present.

**Iodide Titration with  $\text{AgNO}_3$ , Palladious Nitrate as Indicator for.** L. Schneider. (*J. Amer. Chem. Soc.*, 1918, 40, 583.)  $\text{Pd}(\text{NO}_3)_2$  as an indicator for Ag titrations has been found to be satisfactory. The sensitiveness of the indicator is little affected by dilution. The stability of  $\text{PdI}_2$  is greater than that of  $\text{Fe}(\text{CNS})_3$ . Excellent reproducibility and a satisfactory accuracy can easily be obtained for both N/10 and N/1000  $\text{AgNO}_3$  solutions. The use of gum arabic to avoid occlusion of  $\text{AgNO}_3$  and KI has given very good results and is to be recommended. The application of  $\text{Pd}(\text{NO}_3)_2$  as an indicator apparently overcomes difficulties which arise with the Volhard method in the presence of Hg, Pd, and other interfering metallic salts. Finally, the ease and rapidity with which the indicator and also the  $\text{AgNO}_3$  and KI solutions can be prepared are advantages. The  $\text{Pd}(\text{NO}_3)_2$  indicator used was a solution of  $\text{Pd}(\text{NO}_3)_2$  in 16 per cent.  $\text{HNO}_3$  (free from  $\text{HNO}_2$ ) with a metal content of 0.06 per cent.  $\text{Pd}(\text{NO}_3)_2$  may be prepared by dissolving the weighed Pd in  $\text{HNO}_3$  and evaporating to dryness, then dis-

solving the crystals in 15 to 20 per cent.  $\text{HNO}_3$  and filtering. In applying the Pd indicator it was found advisable to employ a protective colloid to prevent the occlusion of  $\text{AgNO}_3$  or KI in N/10 titrations. Then, again, for very dilute solutions, the use of a protective colloid was necessary in order to obtain a precise colorimetric comparison in determining the end point. It was found most advantageous to use an addition of a 5 per cent. gum arabic solution to the  $\text{AgNO}_3$  solution to be titrated. This addition afforded very good precision and satisfactory accuracy. Other protective colloids were tried, such as soluble starch, gelatin, agar-agar, gum tragacanth and white dextrin. The order of their usefulness as protective colloids is, respectively, (1) gum arabic, (2) gelatin and agar-agar, (3) gum tragacanth, (4) dextrin, and (5) soluble starch. For N/10  $\text{AgNO}_3$ , 5 c.c. of a 5 per cent. gum arabic solution was used, whereas for N/1000 solutions, 1 c.c. was sufficient because of the dilution of the electrolytes. To prevent decomposition of the gum arabic solution, a small amount of thymol (less than 0.1 Gm. per 100 c.c. of solution) was added to the filtered gum arabic solution, which then kept for months without any signs of decomposition or mould growth.

*Sensitiveness of Indicator.*—The visibility of  $\text{PdI}_2$ , as determined by adding 0.2 c.c. of N/500 KI to 10 c.c. water containing 0.25 c.c.  $\text{Pd}(\text{NO}_3)_2$  indicator, was 1 part in 1,400,000 parts of solution. The coloration of the liquid was reddish brown and easily discernible, comparison with a blank being unnecessary. Of course, under these conditions, the optimum sensibility was reached since no AgI was present to interfere with the coloration of the liquid.

*The Optimum Quantity of Indicator for Various Dilutions.*—For titrations of N/10  $\text{AgNO}_3$  with N/10 KI in the presence of gum arabic, either 0.5 or 1 c.c. of the indicator may be used with equally good effect for total volumes up to 125 c.c. For volumes from 125 to 225 c.c., the amount of indicator necessary for the easy determination of the end point is 1 c.c. For titrations without gum arabic, at least 1 c.c. of the indicator is required for all volumes ranging up to 225 c.c.

*Permanency of End Point.*—This is very satisfactory, due to the stability of  $\text{PdI}_2$ , and its inappreciable absorption to AgI. It is well known that the colour ( $\text{Fe}(\text{CNS})_3$ ) obtained at the end point in a Volhard titration gradually fades in the presence of  $\text{AgCNS}$ , especially at high temperatures. On the other hand, with the  $\text{PdI}_2$  end point neither temperature nor long standing

affects its stability. For instance, when a check titration of N/1000  $\text{AgNO}_3$  with N/1000 KI the tint was perfectly stable for over a week.

**Iodine, Titration of, with Thiosulphate.** R. Kempf. (*Zeitsch. angew. Chem.*, 1917, 30, i, 71, through *J. Chem. Soc.*, 1917, 112, [2], 502.) Attention is directed to the importance of avoiding the use of an excess of mineral acids in I solutions which have to be titrated with hypo solution. This particularly applies to the titration of I liberated when  $\text{FeCl}_3$  solution is treated with KI. The added hypo tends to be decomposed locally by the HCl before it comes into contact with the I.

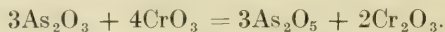
**Kjeldahl Method, Some Limits of.** H. C. Brill and A. Francisco. (*Philipp. J. Sci.*, 1918, 12, 261.) The Kjeldahl method gives low results for N with pyridine, piperidine, quinine, isoquinoline, oxyquinoline, pyrrole, and in some cases with nicotine. The authors believe this arises from the formation of sulphonic acid derivatives and their resistance to decomposition. The Gunning-Arnold method gives more reliable results with pyridine when heated for a considerable period after the solution has become clear.  $\text{Na}_2\text{SO}_4$  is not conducive to good yields and cannot be substituted for  $\text{K}_2\text{SO}_4$ . (See also *Y.B.*, 1911, 181; 1913, 200; and *Gen. Index*.)

**Magnesium Nitrate to Destroy Organic Matter in the Testing for As.** Kohn-Abrést. (*L'Union pharm.*, 1918, 21.) Although the method of calcining organic material with  $\text{Mg}(\text{NO}_3)_2$  undoubtedly occasions a certain loss of As, so that the results obtained are only approximately quantitative, yet the process is so rapid and convenient that it may be advantageously employed for the detection of excessive arsenical contamination in many foods, such as glucose or flour. Fifteen Gm. of the material is moistened in a suitable capsule with 25 c.c. of a 1 : 5 aqueous solution of  $\text{Mg}(\text{NO}_3)_2$ , dried on the sand bath and incinerated at a dull red heat. The white ash is then dissolved in  $\text{H}_2\text{SO}_4$ , 1 : 5, and the solution tested in the usual way in Marsh's apparatus or with Bougault's reagent. A rough determination of the amount of As present may be made by taking the quantity actually found as being 66 per cent. of that actually present.

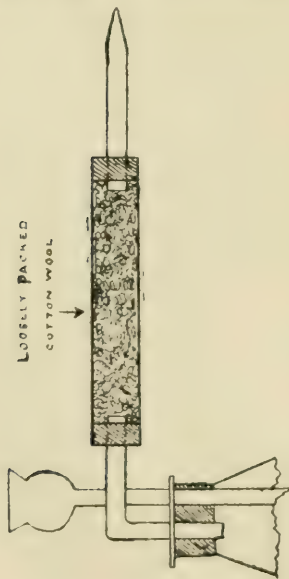
**Manganese and Chromium, Rapid Method for Determining Small Quantities of.** — Travers. (*Comptes rend.*, 1917,



165, 187.) Although given by the author as a method for the determination of Mn and Cr in steel, it is obviously applicable to the estimation of those metals present in small amount in other mixtures. Exactly 0.2 Gm. of the steel or other material, is dissolved in 20 c.c. of  $\text{HNO}_3$ , sp.g. 1.1. Thirty c.c. of water is added, and 5 c.c. of N/10  $\text{AgNO}_3$  solution followed by 1 or 1.5 c.c. of  $(\text{NH}_4)_2\text{S}_2\text{O}_8$  solution. After mixing, the violet colour of  $\text{H}_2\text{MnO}_4$  will appear in about 3 minutes if Mn is present. The volume is then made up to 100 c.c. with cold water and the liquid titrated with  $\text{As}_2\text{O}_3$  solution containing 0.650 Gm. as  $\text{As}_2\text{O}_3$  in 1 litre, until the pink colour is discharged or a greenish yellow colour develops. Under these conditions, each c.c. of the  $\text{As}_2\text{O}_3$  solution used = 0.1 per cent. of Mn for the material used. The Cr may then be titrated, according to the equation :



A slight excess of the  $\text{As}_2\text{O}_3$  solution is run in and titrated back by an equivalent solution of  $\text{KMnO}_4$ . Each c.c. of  $\text{As}_2\text{O}_3$  solution used up is equivalent to 0.114 per cent. of Cr, using 0.2 Gm. of original material.



**Marsh's Apparatus, Modification of, to Prevent Explosion.** W. Kirkby. (*Pharm. J.*, 1918, [4], 46, 286.) The H delivery tube is fitted with a section of a rather greater diameter charged with loosely packed cotton wool. The lighted taper may be applied to the jet immediately the gas begins to be formed without any untoward result, and there is no need to test the explosiveness of the gas with the usual test-tube.

**Manganese Salts, Reaction of.** V. Macri. (*Boll. chim. farm.*, 1917, 56, 377, through *J. Chem. Soc.*, 1917, 112, [2], 511.) When a solution containing Mn, even in very small proportion, is rendered

slightly alkaline and shaken and treated successively with a few drops of alkali oxalate solution and of  $\text{HC}_2\text{H}_3\text{O}_2$ , the liquid

assumes a distinct and persistent rose red colour. The reaction is rendered more sensitive if the alkaline solution is boiled and then allowed to cool before the addition of oxalate and  $\text{HC}_2\text{H}_3\text{O}_2$ , and also if one or two drops of  $\text{H}_2\text{O}_2$  solution are added before the liquid is made alkaline. Salts of other metals do not interfere with the reaction, although those giving coloured solutions, especially if present in marked proportion, may mask it.

**Massicot and Litharge, the Two Modifications of Lead Monoxide.** E. S. Larsen. (*Amer. Min.*, 1917, 2, through *J. Chem. Soc.*, 1918, 114, [II], 118.) Natural specimens of "massicot" from Austria and from Kern Co. and San Bernardino Co., California, consist of minute brownish red scales built up of two minerals with distinct optical properties. The central portion of the plates consists of the yellow orthorhombic modification (nearly colourless under the microscope, optically biaxial and positive,  $\beta = 2.61$ , birefringence very strong), and the borders of the red tetragonal modification (yellowish orange under the microscope, optically uniaxial and negative,  $\omega = 2.64$ , birefringence very strong). It is proposed to restrict the name litharge to the former and massicot to the latter. The border of massicot is probably an inversion product of the litharge.

**Mercuric Oxide, Yellow, as a Standard in Alkalimetry.** G. In cze. (*Zeitsch. anal. Chem.*, 1917, 56, 177, through *J. Chem. Soc.*, 1917, 112, [II], 327.) Yellow  $\text{HgO}$  is readily prepared in a pure state, is anhydrous and non-hygroscopic, and is a trustworthy substance for use in standardizing acid solutions, since it yields an equivalent quantity of  $\text{KOH}$  when treated with  $\text{KI}$ :  $\text{HgO} + 4\text{KI} + \text{H}_2\text{O} = \text{K}_2\text{HgI}_4 + 2\text{KOH}$ . For use, a weighed quantity of about 0.4 Gm. of the  $\text{HgO}$  is mixed with 10 c.c. of 60 per cent.  $\text{KI}$  solution and, as soon as the oxide has dissolved, is titrated with the acid solution to be standardized, using methyl-orange, methyl-red, or phenolphthalein as the indicator.

**Mercuric Oxycyanide, Volumetric Estimation of.** A. Tagliavini. (*Boll. Chim. Farm.*, 1917, 56, 297, through *J. Chem. Soc.*, 1917, 112, ii, 510.) A weighed quantity of 0.3 to 0.4 Gm. of the salt is dissolved in 50 c.c. of cold water, and the liquid, after treatment with 1 Gm. of  $\text{NaCl}$  and a drop of 0.2 per cent. methyl-orange solution, is titrated with  $\text{N}/10$   $\text{HCl}$  until it turns red. After the volume of acid required is read, 2 Gm. of  $\text{KI}$  is added to the solution, and the yellow liquid thus obtained is

again titrated with N/10 HCl as before. From the two volumes of acid required the percentages of oxycyanide and cyanide in the salt may be calculated, the reactions according to the equations: (1)  $\text{HgO} \cdot \text{Hg}(\text{CN})_2 + 2\text{HCl} = \text{HgCl}_2 + \text{Hg}(\text{CN})_2 + \text{H}_2\text{O}$ , and (2)  $\text{Hg}(\text{CN})_2 + 4\text{KI} + 2\text{HCl} = \text{HgK}_2\text{I}_4 + 2\text{KCl} + 2\text{HCN}$  (See also *Y.B.*, 1904, 115, 116: 1909, 159; and *Gen. Index.*)

**Mercury, Detection of, for Forensic Purposes.** C. L. Spica. (*Boll. chim. farm.*, 1917, 56, 437, through *J. Chem. Soc.*, 1917, 112, [II], 545.) In cases of suspected mercurial poisoning, it is of importance to be able to decide whether the Hg found *post-mortem* was in the form of a soluble or insoluble compound when ingested. From his experiments on viscera preserved in aqueous EtOH, the author finds that  $\text{HgCl}_2$  passes in time into a compound, from which it can be extracted only by the use of HCl. When  $\text{HgCl}$  is kept in like manner in contact with visceral material for a long time, it is very doubtful whether any of it is converted into a compound soluble in aqueous EtOH, but a considerable quantity of it is found in a form soluble in HCl, and much of it remains apparently unchanged. (See also *Y.B.*, 1913, 178: 1916, 181: 1917, 106, 109; and *Gen. Index.*)

**Mercury, Estimation of, in Galenical Preparations.** H. Wastenson. (*Pharm. Post.*, 1917, 50, 125, through *J. Chem. Soc.*, 1917, 112, [2], 509.) The substance (0.3-0.5 Gm.) is heated with strong  $\text{H}_2\text{SO}_4$  (10 c.c.) and  $\text{HNO}_3$  (D 1.4, 3 c.c.) until reddish-yellow vapours are not further evolved, the liquid has become clear and colourless, and the flask filled with  $\text{H}_2\text{SO}_4$  fumes. If the vapours still smell of  $\text{SO}_2$ , treatment with  $\text{HNO}_3$  (3 c.c.) is repeated. After being cooled, water (25 c.c.) is added, which is removed by evaporation. The cold solution is treated with water (15 c.c.) and  $\text{K}_2\text{Mn}_2\text{O}_8$  solution until a permanent pink coloration is produced: the latter is discharged with  $\text{FeSO}_4$ , the solution diluted with water (75 c.c.), and titrated with N/10  $(\text{NH}_4)\text{CNS}$  solution in the presence of ferric alum. The method is suitable for organic and inorganic preparations of the oxides of Hg, but not for such as contain the haloids. It can also be used for estimating Hg in ointments, plasters, and pills, provided that the ointments are tolerably free from paraffins. (See also *Y.B.*, 1907, 103: 1912, 157, 158: 1916, 179; 1917, 108.)

**Mercury Salts, Volumetric Determination of; Assay of  $\text{HgCl}_2$  Tablets.** G. Adanti. (*Boll. chim. farm.*, 1916, 55, 553-4,

through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 659.) One Gm. of the Hg salt or tablet is dissolved in water and the volume completed to 250 c.c.; to a 50 c.c. aliquot are added 5 c.c. of a 40 per cent. HCHO solution and 10 c.c. of a 33 per cent. KOH or NaOH solution. The mixture is heated on a water bath for several minutes and then allowed to cool, a black precipitate of metallic Hg being obtained. The liquid is neutralized with AcOH and the precipitate is collected and washed; to the filter and precipitate are then added 100 c.c. of water slightly acidulated with AcOH and 20 c.c. of a N/10 I solution and the mixture is shaken until all the reduced Hg passes into solution as  $\text{HgI}_2$ . The solution is coloured brownish yellow by the excess of I. The excess of the latter is determined by means of a N/10  $\text{Na}_2\text{S}_2\text{O}_3$  solution, thus permitting calculation of the combined I and Hg.

**Nitrates, Gasometric Determination of.** C. A. Hill. (*Analyst*, 1918, **43**, 215.) The usual mode of determining nitrates by shaking with  $\text{H}_2\text{SO}_4$  in a Hg-charged nitrometer leaves much to be desired. If an external reaction-bottle be used, it is necessary to fill it previously with a gas inert towards NO. It is convenient to use CO, which is readily prepared in pure condition by gently warming a mixture of  $\text{NaCHO}_2$  and  $\text{H}_2\text{SO}_4$ , no wash-bottles being required. It may be noted that CO has a density approximating closely to that of air. In one experiment with this method 0.1794 Gm.  $\text{KNO}_3$  was found, the quantity of pure salt weighed being 0.1790 Gm. The method may find useful application in the analysis of nitro-celluloses or other nitrogen compounds reacting in like manner with Hg and  $\text{H}_2\text{SO}_4$ .

**Nitrates, Modification of Pelouze's Method for Estimating.** E. A. Letts and Florence W. Rea. (*Proc. Roy. Soc. Edinburgh*, 1915, **35**, 168-9, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 3193.) Place 10 c.c. N/ $\text{FeSO}_4$  solution and 5 c.c. strong  $\text{H}_2\text{SO}_4$  in a flask, cool, attach a reflux condenser and expel the air by means of a current of  $\text{CO}_2$ . Introduce the sample into the flask and heat for 15-30 minutes. Finally cool the contents and titrate with  $\text{KMnO}_4$ . This method has proved very satisfactory and is especially recommended for the estimation of nitrates in water.

**Organic Matter, Destruction of, in Detection of As and other Metals.** A. Gautier and P. Clausmann. (*Comptes*



*rend.*, 1917, **165**, 11.) A known weight of the substance is first baked in an oven at  $300^{\circ}\text{C}$ . until crisp. It is then mixed in a mortar with 2 to 3 per cent. of its dry weight of  $\text{CaO}$ . Enough water is added to slake the  $\text{CaO}$  and the mixture rubbed to powder, transferred to a flat bottom porcelain dish, is heated to dull-redness until all organic matter is burned off. With the most refractory material this will take only an hour or two. The grey or white ash is taken up with water acidified with  $\text{H}_2\text{SO}_4$ , heated to boiling, filtered, evaporated, until white fumes begin to show, diluted with 8 or 10 volumes of water, and poured directly into the Marsh's apparatus. The method specially useful in the toxicological detection of As.

**Perchlorates, Microdetection of.** G. Denigès (*Annales Chem. analyt.*, 1917, **22**, 127.) The reagents used are (1) 1 : 100 aqueous solution of strychnine sulphate; (2) a 1 : 50 solution of brucine in  $\text{HC}_2\text{H}_3\text{O}_2$ ; (3) a 1 : 50 aqueous solution of morphine. A drop of a solution of a soluble perchlorate or of the free acid is placed on a micro-slide in a spheroid form not too much spread out. A drop of one of the reagents is then applied by means of a very finely pointed stirrer which is plunged in obliquely until it touches the slide. When a considerable quantity of perchlorate is present, an almost immediate turbidity will occur. If it does not, the tip of the rod is moved around concentrically on the slide. A cloudiness will then soon appear. The preparation should at first be examined with a low power and without a cover glass: then the cover may be put on and a higher power used. With strychnine sulphate grouped needles of strychnine perchlorate will be obtained with an equivalent of 1 of perchloric acid in 1000. With brucine acetate lozenge-shaped crystals with 2 or 3 : 1000 and with morphine hydrochloride reagent, long radiating needles with 1 : 200. The strychnine reaction is therefore the most sensitive. The form of the crystals of all these alkaloidal perchlorates is said to be characteristic.

**Permanganate, Volumetric Centinormal Solution of.** J. O. Halverson and O. Bergeim. (*J. Ind. Eng. Chem.*, 1918, **10**, 119.) The usual method of making weak standard solutions of  $\text{KMnO}_4$  by dilution of stronger solutions is inaccurate. To avoid the inaccuracy of dilution permanent N/100 solutions may be prepared as follows: Dissolve 0.40 Gm. of pure  $\text{KMnO}_4$  crystals in one litre of redistilled water in a thoroughly clean

Florence flask which has been rinsed with the same water. Digest at or near the boiling point for 36 hours. A funnel covered with a watch-glass may be used as a reflux condenser. Cool and allow to stand over night. Without disturbing the sediment of manganese oxides, filter with gentle suction through a 3-in. Büchner funnel lined with ignited asbestos. Both funnel and filter flask should be rinsed with redistilled water. Transfer the solution to a glass-stoppered bottle free from traces of organic matter. The solution should be kept in the dark when not in use. If the asbestos becomes clogged with oxides these may be dissolved out with hot strong HCl, followed by washing with redistilled water without disturbance of the pad.

After standing 2 or 3 days this solution may be standardized against  $N/50$   $H_2C_2O_4 \cdot 2H_2O$  (0.1261 Gm. of pure crystals to 100 c.c.) or  $Na_2C_2O_4$  of similar strength. To 10 c.c. of the  $H_2C_2O_4$  solution add 10 c.c. of 10 per cent.  $H_2SO_4$  which has been treated with just sufficient  $KMnO_4$  solution to give it a faint pink tint. Place in a water bath at  $65^\circ C$ . for a few minutes. Then titrate at once to a definite pink colour which persists for at least a minute. Correct for the blank obtained by titrating 10 c.c. of the  $H_2SO_4$  and the same volume of water to the same end point. If kept in a dark place, the  $H_2C_2O_4$  acid solution used in standardization does not lose appreciably in strength in from 10 days to 2 weeks. Ordinarily the  $KMnO_4$  solutions after they have stood several days will not vary over 0.1 per cent. per week. On account of the sensitivity of the reagent it is, nevertheless, desirable to check it rather frequently.

**Potassium and Na, Determination of as KCl or NaCl with the Refractometer.** B. A. Shippy and G. H. Burrows. (*J. Amer. Chem. Soc.*, 1918, **40**, 185.) The  $n$  of solutions containing the same total percentages by weight of mixtures of NaCl and KCl vary linearly with the concentration of the single constituents. The  $n$  of a 20 per cent. solution of NaCl is 1.36829 and  $n$  for a 20 per cent. solution of KCl is 1.35992 at  $20^\circ C$ . The percentage of KCl in a mixed solution is given by the formula  $(1.36829 - n) / (1.36829 - 1.35992)$ ,  $n$  being the refractive index of a 20 per cent. solution of the unknown mixture.

**Potassium, Determination of, in Rocks, Clays, etc.** B. Blount. (*Analyst*, 1918, **43**, 117.) A small portion of the bulk ground sample is very finely ground in an agate mortar and if necessary dried again. One-half Gm. to 2 Gm. is weighed

out, transferred to a fair-sized Pt crucible, and digested for 2 or 3 hours with a 10 c.c. purest HF (that supplied in ceresin bottles) and 2 c.c. of pure  $\text{H}_2\text{SO}_4$ . If necessary, a further 10 c.c. of HF is added, and the whole gently evaporated till most of the  $\text{H}_2\text{SO}_4$  has been fumed off, great care being taken to prevent loss by spurting. The anhydrous sulphates are taken up by digesting with HCl, and the diluted solution filtered off through a small filter, retaining the insoluble matter in the dish. This is further digested with HCl and filtered off as before, and if any residue still remains, which is usually due to insufficient attack, it is washed on to the filter-paper, which is then thoroughly washed, dried, very gently ignited in a Pt crucible, and the above process of treatment with HF, etc., repeated. The original grinding in the agate should be so thorough that further grinding at this stage should be unnecessary, as it would involve loss. In the case of materials such as limestone, etc., the bulk of which can be readily dissolved, the method is modified, in that the material is first digested with HCl, and the insoluble portion is then treated as above and added to the main solution. *Removing other Constituents.*—The Fe, Al and Mn are removed by the addition of Br and AmOH, and a short digestion. The precipitate is filtered off and thoroughly washed. AmOH is added to the filtrate and the whole boiled.  $\text{Am}_2\text{C}_2\text{O}_4$  is then added and the whole boiled up again. After the precipitate has been allowed to settle, the  $\text{CaC}_2\text{O}_4$  is filtered off and washed thoroughly, and the filtrate gently evaporated to a low bulk. The basin is then covered and sufficient  $\text{HNO}_3$  is added to decompose the ammonium salts, and, whilst still covered, the whole is evaporated until just dry, or until fumes of  $\text{H}_2\text{SO}_4$  appear. After cooling, the residue is taken up in 2 or 3 c.c. of HCl and a little water, and gently evaporated to low bulk. The solution is diluted, a small excess of a clear solution of  $\text{Ba}(\text{OH})_2$  is added, and the whole digested for about half an hour, during which time a slight skin of  $\text{BaCO}_3$  should form on top, showing that an excess is present. The precipitate is filtered off and thoroughly washed, and the filtrate digested with excess of  $\text{Am}_2\text{CO}_3$ , and the precipitated  $\text{BaCO}_3$  filtered off and washed. The filtrate is evaporated to low bulk on a water bath, a few c.c. of HCl are cautiously added, and the whole transferred to a small Pt dish, and evaporated to dryness on a water bath. The residue is very gently ignited over an argand burner to drive off all the AmCl, the crude alkali chlorides dissolved in a small quantity of water, a drop

or two of  $\text{Am}_2\text{CO}_3$  added, and digested for a minute or two, and the whole filtered off through a very small filter with thorough washing into a weighed Pt dish. The filtrate is evaporated on a water bath and the residue carefully ignited over an argand, cooled in a desiccator, and weighed. This is the weight of the pure alkali chlorides. As K adheres very persistently to all the precipitates and filter-papers, it is absolutely essential that the washings should be very thorough at all the various stages. It is better to have to remove traces of any slightly soluble precipitate such as MgO from the crude alkali chlorides than to run the risk of leaving some of the K in the precipitates or filter-papers. *Separation of Potassium from Sodium.*—Although many methods have been tried, such as the cobaltinitrite and perchlorate methods, the older method of  $\text{PtCl}_4$  still seems the best where accuracy is required. The pure alkali chlorides, obtained as above, are dissolved in a small quantity of water (and should of course leave no residue) and sufficient  $\text{PtCl}_4$  added to combine with the whole of the K and Na salts and leave a slight excess. The solution is evaporated on the water bath till it begins to get pasty, then cooled, diluted with a sufficient quantity of EtOH 80 per cent. to take up the whole of the Na salt, and allowed to stand for a few hours. If the quantity of alkali is large, it is better to take up the pasty chlorides in a small measured quantity of hot water, cool, and add sufficient absolute EtOH to bring the final solution to 80 per cent. by volume. The precipitate of  $\text{PtCl}_4 \cdot 2\text{KCl}$  is filtered off, washed with 80 per cent. EtOH until quite free from Na salts, warmed to drive off the EtOH, and then dissolved through into a weighed Pt dish by means of boiling water, evaporated to dryness, dried in an air oven, cooled and weighed.

*Working up Platinum Residues.*—The best and shortest way is to take the whole mass to dryness and ignite to full redness ( $1100^\circ \text{C.}$ ). The mass is ground finely and extracted with water, then with HCl, washed well, and then extracted with  $\text{HNO}_3$ . The residue is again ignited and extracted with aqua regia. The solution is evaporated to dryness, and taken up with HCl and water. All solutions except the first aqueous extract are returned to be worked up with the next batch.

On account of the scarcity of Pt it is advisable to have an alternative method. The best of these is the  $\text{KClO}_4$ , which may be conducted as follows: Dissolve the mixed chloride in the previous extraction process in 10 to 15 c.c. of hot water and add



as much  $\text{HClO}_4$  as is theoretically necessary to precipitate the mixed perchlorates. Evaporate the mixture on a water bath to a syrup until fumes of  $\text{HClO}_4$  begin to appear. Cool, take up the mass in hot water and add 5 or 6 c.c. of  $\text{HClO}_4$ . Re-evaporate until fumes of  $\text{HClO}_4$  again appear. The object of this treatment is to remove  $\text{HCl}$ , which is important. Stir the cold mass with about 20 c.c. of  $\text{EtOH}$  96 to 97 per cent. containing 0.2 per cent. by weight of  $\text{HClO}_4$ . Keep the  $\text{KClO}_4$  as coarsely granular as possible. Let settle. Decant through a dried, tared Gooch crucible. Wash the residue by decantation through the Gooch crucible three times. About 20 c.c. of the  $\text{EtOH}$  will be needful for the washing. Transfer the precipitate to the Gooch crucible by means of  $\text{EtOH}$ . Some prefer to wash the residue at this stage with a mixture of equal volumes of  $\text{EtOH}$  and  $\text{Et}_2\text{O}$ . Dry the precipitate at  $120\text{--}130^\circ\text{C}$ . for about 30 minutes. Weigh as  $\text{KClO}_4$ .

**Potassium Bicarbonate as an Analytical Standard.** G. B r u h n s. (*Chem. Zeit.*, 1917, **41**, 386, through *J. Chem. Soc.*, 1917, **112**, [2], 419.) The author confirms the conclusion previously arrived at by Winkler and Incze that  $\text{KHCO}_3$  is a trustworthy analytical standard for all but extremely accurate work. It may be prepared even more simply than these authors suggest by allowing the ordinary "pure" salt in fine powder to remain exposed for several hours in a dry room. Standardized against fused  $\text{NaCl}$ , a sample prepared in this way was found to be correct to 0.02 per cent. Solutions stronger than  $\text{N}/10$  should not be employed, owing to the tendency to evolve  $\text{CO}_2$ , which is exhibited by concentrated solutions.

**Precipitates, Common, Suggested Manipulation for Obtaining.** G. H. B r o t h e r. (*J. Ind. Eng. Chem.*, 1918, **10**, 129.) The following directions are given for obtaining precipitates which are retained by filter paper of moderately close texture. In the case of  $\text{BaSO}_4$ , the solution should contain about 1 c.c. of  $\text{HCl}$  (sp.g. 1.2) per 200 c.c.; it should be heated to boiling, treated with about one-half the required quantity of  $\text{BaCl}_2$  solution, added drop by drop, and the remainder of the barium  $\text{BaCl}_2$  is added after the lapse of 5 minutes. The mixture is ready for filtration after a further 15 minutes' digestion.

$\text{CaC}_2\text{O}_4$  is readily obtained in a crystalline state by treating the boiling solution of the calcium salt with an excess of  $(\text{NH}_4)_2\text{C}_2\text{O}_4$ , dissolving the precipitate by adding a very slight excess

of HCl, then adding AmOH drop by drop until the precipitate has formed again, and keeping the mixture hot for 30 minutes.

For the precipitation of ammonium phosphomolybdate, the phosphate solution is rendered ammoniacal, then acidified with  $\text{HNO}_3$ , heated to boiling, and treated at this temperature with ammonium molybdate solution. When a phosphate is precipitated with magnesia mixture, the precipitate should be dissolved by the addition of HCl, the solution heated to boiling, and AmOH then added slowly until a distinctly crystalline precipitate has formed; the mixture is now cooled, one-fifth of its volume of AmOH sp.g. 0.900 is added, and, after 15 minutes, the precipitate is collected on a filter.

**Pyrolusite, Determination of Available Oxygen in.** O. L. Barnebey. (*J. Ind. Eng. Chem.*, 1917, **9**, 961.) The following method is recommended as giving satisfactory results: The well-mixed sample is ground so as to pass through a 200-mesh sieve, and dried at  $105^\circ \text{C}$ . until constant in weight. Then 0.5 Gm. is heated with 50 c.c. of standard  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  solution (90 Gm. in 200 c.c. of  $\text{H}_2\text{SO}_4$  of sp.g. 1.84 and 900 c.c. of water) until dissolved, the solution diluted to about 150 c.c., and the excess of  $\text{FeSO}_4$  titrated with standard  $\text{KMnO}_4$  solution.

**Selenium, Detection of, in  $\text{H}_2\text{SO}_4$ .** P. J. Palet. (*Annales Chim. analyt.*, 1918, **23**, 25.) If a crystal of aspidospermine is heated in a few drops of the  $\text{H}_2\text{SO}_4$  to be tested until acid fumes are given off an intense violet colour will be produced if a trace of Se is present. If the acid is free from Se, no colour will be formed. The reaction is much more distinctive than the red colour obtained by reducing agents, or than the fugitive green tint given by codeine in seleniferous acid. (See also *Y.B.*, 1915, 140; and *Gen. Index*.)

**Sodium Cyanide as a Substitute for KCN.** W. J. Sharwood. (*J. Ind. Eng. Chem.*, 1918, **10**, 293.) At the present time the greater part of the so-called "potassium" cyanide used for metallurgical and other technical purposes is really NaCN. In a great majority of cases NaCN is as efficient, if not more so, than KCN as a reagent or solvent. The commercial salt is also cheaper, and is easily obtainable in a state of great purity equivalent to 98 per cent. of NaCN. Four parts of this salt is equivalent in solvent power for Ag or Au to 5 parts of the "98 per cent. KCN" formerly in commerce. It is suggested

that in future the sodium salt alone should be used, and valued on its actual percentage of NaCN. NaCN also has the advantage of being non-deliquescent, and of being more soluble in water than KCN.

**Sodium Hydroxide, or KOH solution free from  $\text{CO}_2$ .** H. A. Noyes. (*Chem. Analyst*, 1917, [23], 7, 10.) The following expedient allows a strong solution of NaOH or KOH to be prepared from which  $\text{CO}_2$  free standard solutions may be made by dilution. The method is claimed to be more convenient than the two processes generally employed, the use of  $\text{Ba}(\text{OH})_2$  to remove  $\text{CO}_2$ , or the decomposition of  $\text{H}_2\text{O}$  with Na or K. A 1000 c.c. florence flask is fitted with a rubber stopper coated with paraffin and filled about two-thirds full of distilled water. NaOH or KOH, purified by EtOH, is added at intervals (to prevent too great heating) until a concentrated solution of hydroxide is obtained (approximately 1 Gm. of alkali per c.c. of water). The carbonates are insoluble in this concentrated solution and settle out by the time the flask is cold. The concentrated liquid is both carbonate and  $\text{CO}_2$  free, and can be pipetted or decanted off as required.

**Sodium Sulphate, Simple Method for Testing for As.** P. Charles. (*Répertoire*, 1918, 29, 161.) The following method requires no special apparatus and can be carried out under ordinary conditions in the pharmacy. One hundred c.c. of distilled water is placed in an ordinary "half bottle" wine bottle, with 5 Gm. of pure  $\text{H}_2\text{SO}_4$  and 5 Gm. of pure Zn. A filter paper 5 cm. in diameter, previously moistened in 1 : 100  $\text{HgCl}_2$  solution and dried is folded over the mouth and neck so as to form a cap and band. This is kept in position by an inverted capsule or an ordinary tumbler. If at the end of 40 to 50 minutes the test paper remains colourless, the  $\text{Na}_2\text{SO}_4$  is free from As. In presence of that impurity, the familiar yellow to brown stain will be apparent, the depth of the tint varying with the degree of contamination.

**Standardizing Solutions, Accurate Method for taking Aliquots of a Standard.** C. F. Miller. (*J. Amer. Chem. Soc.*, 1917, 39, 2388.) About five times as much of the standard substance is weighed out and dissolved in a quantity of water slightly exceeding five times the capacity of the pipette to be used in taking the aliquot portions. This pipette need not be standard-

ized. Five portions of the solution are now pipetted into separate vessels, and the remainder of the solution, together with the rinsings from the pipette, is transferred to a tared Pt dish, evaporated, the residue dried, and weighed. A simple calculation gives the quantity of substance taken for each titration. The method can be used only for such salts as  $\text{Na}_2\text{CO}_3$ ,  $\text{Na}_2\text{C}_2\text{O}_4$ , etc., which are soluble, and leave weighable residues on evaporation.

**Sulphate, Rapid Detection of, in Insoluble Matter.** G. Dénigès. (*Bull. Soc. Chim.*, 1918, 23, 36.) The method, based on the formation of yellow crystals of  $\text{Hg}_3\text{O}_2\text{SO}_4$  (turpeth mineral) on the surface of the insoluble sulphate, may be used for the microchemical identification. The reagent is thus prepared. Dissolve 10 Gm. of crystalline  $\text{Hg}(\text{NO}_3)_2$  in a mixture of 100 c.c. of water and 1 c.c. of  $\text{HNO}_3$  (sp.g. 1.39). To detect  $\text{CaSO}_4$ , treat 0.02–0.03 Gm. with 2–3 c.c. of the reagent and mix, obtaining immediately the yellow coloration. The test may be made on a slide using 1 drop of the reagent.  $\text{Hg}_2\text{SO}_4$  responds to the test almost as rapidly as  $\text{CaSO}_4$ , giving the same microscopic appearance. With  $\text{SrSO}_4$ , the transformation is slower, requiring 15–20 seconds in the cold, but is instantaneous on warming.  $\text{BaSO}_4$  suspended in the reagent does not react in the cold, even after long contact; on heating to boiling a yellowish coloration results, which is intensified on prolonged boiling.  $\text{PbSO}_4$  is coloured immediately in the cold. The precipitated  $\text{BaSO}_4$  of commerce contains sufficient soluble  $\text{SO}_4$  ( $\text{H}_2\text{SO}_4$ , alkali sulphates) to give the test directly. The test cannot be applied directly in the presence of halogens.

**Sulphuric Acid, Nitrate Test for.** H. D. Steenberg. (*Chem. Weekblad*, 1917, 14, 647, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2866.) The  $\text{H}_2\text{SO}_4$  used in the nitrate test should give no blue ring when distilled water containing a little diphenylamine reagent is poured gently on it. War time acid is not as pure as this, and the usual purification methods do not suffice. However, if the acid is shaken vigorously and repeatedly with Hg, and allowed to stand until free from bubbles, it serves very well for the test.

**Zinc Oxide Contaminated with Pb.** C. H. Lawall. (*Amer. J. Pharm.*, 1917, 89, 353.) Ninety per cent. of the ZnO on the market at the present time will not only not answer the U.S.P. test for absence of heavy metals but in the majority of instances



Pb is present, ranging from 0.1 per cent. to 0.5 per cent. calculated as metallic Pb. A satisfactory method of detecting and estimating the Pb which seems to be present occasionally as  $\text{PbSO}_4$  is to dissolve 5 Gm. of the sample of  $\text{ZnO}$  in a slight excess of dilute  $\text{H}_2\text{SO}_4$ , with gentle heat; collect and wash the precipitate with distilled water; then pour through the filter containing the precipitate a concentrated solution of  $\text{AmC}_2\text{H}_3\text{O}_2$  (about 25 per cent.) freshly made, and to this filtrate which now contains the lead in a soluble form add a slight excess of solution of  $\text{K}_2\text{CrO}_4$  which will precipitate insoluble  $\text{PbCrO}_4$  which may be collected on counterpoised filters, or on a Gooch crucible mat, washed, dried, weighed and calculated as to its percentage. A more expeditious method which gives very good results with the amount of Pb usually found at the present time is to simply dissolve 5 or 10 Gm. of the sample in an excess of  $\text{HC}_2\text{H}_3\text{O}_2$  and then precipitate with  $\text{K}_2\text{CrO}_4$  in this solution directly, and collect, wash and weigh the precipitate as before. This latter modification will give low results, however, where part of the Pb is present in the form of  $\text{PbSO}_4$ , as is often the case, as the  $\text{PbSO}_4$  will remain behind when the solution is made in  $\text{HC}_2\text{H}_3\text{O}_2$ .

**Zinc Sulphocarbolate, Volumetric Estimation of.** G. A d a n t i. (*Boll. Chim. Farm.*, 1917, **56**, 317, through *J. Chem. Soc.*, 1917, **112**, ii, 517.) In the presence of bromine and an acid, zinc sulphocarbolate reacts in accordance with the following equations:  $(\text{OH}.\text{C}_6\text{H}_4.\text{SO}_3)_2\text{Zn} \cdot 7\text{H}_2\text{O} + \text{H}_2\text{SO}_4 = \text{ZnSO}_4 \cdot 7\text{H}_2\text{O} + 2\text{OH}.\text{C}_6\text{H}_4.\text{SO}_3\text{H}$  and  $2\text{OH}.\text{C}_6\text{H}_4.\text{SO}_3\text{H} + 12\text{Br} \rightarrow 2\text{C}_6\text{H}_2\text{Br}_3.\text{OH} + 6\text{HBr}$ . Exactly 0.5 Gm. of the crystalline salt is dissolved in water and made up to 500 c.c. In a flask holding about 300 c.c. and fitted with a ground stopper, 50 c.c. of this solution is mixed with 50 c.c. of 0.6 per cent.  $\text{KBr}$  solution and 50 c.c. of 0.1671 per cent.  $\text{KBrO}_3$  solution, 5 c.c. of strong  $\text{H}_2\text{SO}_4$  being then added, and the flask again shaken and left closed in a dark place at about  $25^\circ\text{C}$ . for 3 hours. Ten c.c. of 10 per cent.  $\text{KI}$  solution, recently prepared, is next added, and, after the lapse of an hour, the  $\text{I}$  liberated is titrated with  $\text{N}/10$  hypo. The number of c.c. of the latter used is subtracted from that required in a blank test with the 50 c.c. of  $\text{KBr}$  and 5 c.c. of  $\text{KBrO}_3$  solutions alone: the remainder, multiplied by 0.00447, gives the weight in Gms. of crystallized zinc sulphocarbolate in the 50 c.c. of solution taken.

## ORGANIC CHEMISTRY, UNCLASSIFIED

**Acetic Acid, Glacial, Water Content of.** N. S c h o o r l. (*Pharm. Weekblad*, 1917, **54**, 945, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 3008.) Solubility tests are the most convenient for determining water in glacial HOAc; the best liquid to use is  $\text{CCl}_4$ . It is miscible in all proportions with anhydrous AcHO, but not in AcOH containing water. The colour imparted by a little I facilitates the test; it is yellow-brown with equal volumes, violet with  $5\text{CCl}_4$  to 1 HOAc. Small amounts of  $\text{H}_2\text{O}$  retard the transition and cause separation into layers, the upper (aqueous) yellow-brown, the lower violet. A table giving a quantitative study of these effects is presented. Up to 5 per cent.  $\text{H}_2\text{O}$  can be determined within about 1 per cent. Tests with  $\text{CS}_2$  are unreliable because of its too low solubility and too high volatility. The solubility of  $\text{CHCl}_3$  with less than 5 per cent. of water is too great, but it gives good results from 5 to 15 per cent. (See also *Y.B.*, 1912, 162, and *Gen. Index*.)

**Acetylene, Delicate Test for.** — S c h u l z. (*Zeit. angew. Chem.*, 1916, [1], 341, through *Schweiz. Apoth. Zeit.*, 1917, **55**, 533.) A reagent is prepared by dissolving  $\text{CuCl}_2$  0.75 Gm. and  $\text{AmCl}$  1.5 Gm. in a little water; adding  $\text{AmOH}$  20 per cent. 3 c.c., and hydroxylamine hydrochloride 2.5 Gm. To this is added 6 c.c. of 2 or 3 per cent. solution of gelatin. The object of this last is to suspend the precipitate formed by the acetylene. The mixture is then made up to 50 c.c. If air containing only a trace of acetylene is shaken up with this solution, a pink to red colour is given; or filter paper moistened in the reagent may be exposed to the atmosphere. By aspirating air containing a known volume of acetylene through 5 c.c. of the reagent, a colour standard may be obtained for the determination of a small trace of that gas in a given volume of atmosphere.

**Acetylsalicylic Acid, Characters and Tests for.** C. A. G r a u. (*Rev. Centro estud. chim. pharm.*, 1917, 207, through *J. Pharm. Chim.*, 1917, **17**, 201.) In appearance different samples of pure acetylsalicylic acid may present great divergencies from uniformity. Solubility 1 : 4.5 in EtOH : 1 : 10 in  $\text{Et}_2\text{O}$  : 1 : 26 in  $\text{CHCl}_3$ ; 1 : 500 in water at  $15^\circ\text{C}$ ., and about 1 : 100 at  $37^\circ\text{C}$ . The m.p. should be taken with very small crystals by the capil-

lary tube method in a  $\text{H}_2\text{SO}_4$  bath. It was found to be 131–132° C. The observations of Boujean and Tsakalotos are confirmed, that on prolonged heating acetylsalicylic acid readily forms salicylsalicylic acid with loss of part of the acetic acid and a lowering of the m.p. Consequently the m.p. determination should be made quickly. It is an advantage to employ a capillary tube of pure acid, side by side with the sample being tested. The presence of free salicylic acid is tested for thus: Twenty Gm. of the sample is treated with 20 c.c. of distilled water and filtered. To 5 c.c. of this filtrate 1 drop of a 7 or 8 per cent. solution of  $\text{FeCl}_3$  is added. No violet colour should be given. Another 5 c.c. of the filtrate is treated with 1 drop of  $\text{NaOH}$  solution, sp.g. 1.33, followed by 3 drops of 1 : 20  $\text{H}_2\text{SO}_4$ . On then adding 1 drop of  $\text{FeCl}_3$  reagent an immediate violet reaction is obtained. To the remaining aqueous filtrate 0.10 Gm. of  $\text{CaCO}_3$  is added, well shaken up and filtered. On slowly adding a little of the  $\text{FeCl}_3$  reagent to this filtrate a brownish precipitate is formed soluble in excess of  $\text{FeCl}_3$ , without any vinous red colour, which would indicate free salicylic acid. For quantitative assay, the method of Astruc should be employed. (See also *Y.B.*, 1917, 269, 270.)

**Acetylsalicylic Acid, Examination of American-made.** P. N. Leech. (*J. Ind. Eng. Chem.*, 1918, 10, 288.) The accepted official and unofficial tests for acetylsalicylic acid have been reviewed, and the examination of American-made commercial specimens of that product were made on behalf of the Council of Pharmacy and Chemistry of the American Medical Association.

In European countries, for purposes of purity the requirements for the drug are essentially that the specimen should have a certain m.p., should show absence of salicylic acid by means of  $\text{FeCl}_3$  (the manipulations for the tests are variously described) and leave no appreciable ash. The two tests of purity most generally employed, however, are the m.p. and the reaction with  $\text{FeCl}_3$ .

**Melting Point.**—The m.p. of acetylsalicylic acid has been given at various temperatures from 118° to 137° C.; the B.P. gives at 133° to 135° C.; the Ph. G. "about 135° C.": the French Codex at 135° C.; *New and Non-official Remedies*, 1917, 134–136° C. The Bayer Company, in the patent trial at Chicago a number of years ago, gave among the "four infallible tests" a m.p.

of "about 135° C." Several workers have carefully determined the m.p. in recent years. Emery and Wright in 1912 found that "Aspirin, Bayer" melted at 130.5–131° C. In France, François has determined the m.p. of pure acetylsalicylic acid, which, according to his method, is 132° C. When various samples of acetylsalicylic acid were examined by the author, it was found that the m.p. of none was as high as that described in *New and Non-official Remedies* or the B.P., Codex, or Ph.G. when taken according to the general method of the U.S.P. ix. On critical observation, it may be seen that the m.p. is preceded and accompanied by decomposition. If the sample in the melting tube is heated from the original room temperature of the bath to 120° C., the temperature of melting will be lower than if the bath is first heated to 120° C. and the melting-point tube then placed in the bath. Thus the melting point of acetylsalicylic acid, like so many organic compounds which decompose and do not melt sharply, is unsatisfactory and cannot be taken as an "infallible test" of purity, especially when determined by different operators who do not give their method in detail. After making a large number of m.p. determinations of acetylsalicylic acid, alone and in parallel with other operators, it was decided to use the method of the U.S.P. modified by first heating the bath to 120° C. before attaching the melting-point tube to the thermometer. The m.p. of purified acetylsalicylic acid was thus found to be 131.5–132.5° C. (corr.). With the exception of one specimen, which was obviously impure, the various specimens examined melted between 128° and 133° C. It would appear that this range of melting points would be more acceptable and reliable than the m.p. described in various standards.

*Presence or Absence of Free Salicylic Acid.*—It is generally conceded that the presence of salicylic acid in amounts more than traces is deleterious. Furthermore, the amount of salicylic acid is a good index of the purity of the acetylsalicylic acid, because the test is so delicate that, under favourable conditions, mere traces may be determined and, as a rule, the better the product, the less the amount of free salicylic acid. The tests appearing in various pharmacopoeias for salicylic acid as an impurity in acetylsalicylic acid do not give concordant results, different workers interpreting the results differently, nor are they detailed in such a manner as to yield maximum delicacy.



After experimentation, it was decided to establish a "limit" test of approximately 0.1 per cent. free salicylic acid, when carried out according to the following method :

0.1 Gm. of the substance was placed in a dry colorimeter tube and 1 c.c. of alcohol,\* previously distilled over NaOH, was added. After the acetylsalicylic acid had dissolved, 48 c.c. of water and 1 c.c. of fresh 0.1 per cent.  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  solution were added. At the same time a control was run by treating 1 c.c. of a "standard" salicylate solution the same as above.† If within 2 minutes the colour given by the acetylsalicylic acid is not more intense than the colour given by the "standard," the presence of not more than 0.1 per cent. free salicylic acid is proved. The solutions used were prepared as follows : Redistilled alcohol was treated with a small amount of sodium hydroxide for 24 hours, then again distilled. The colour standard was made by dissolving 0.116 Gm. of dried sodium salicylate in water, adding 1 minim of glacial acetic acid, and making up to 1000 c.c. Each c.c. represents 0.1 Mgm. of salicylic acid.‡ The  $\text{FeCl}_3$  solution was made by diluting 1 c.c.  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  test solution U.S.P. with 99 c.c. of water. The diluted solution must be freshly prepared each day.

With one exception, all of the commercial specimens examined responded satisfactorily to the above test, showing less than 1 part salicylic acid in 1000 parts acetylsalicylic acid.

*Other Tests.*—*New and Non-official Remedies*, 1917, requires that acetylsalicylic acid shall form a clear solution with warm  $\text{Na}_2\text{CO}_3$  solution ; that sulphates, chlorides, and heavy metals shall be absent ; that 0.5 Gm. shall leave no weighable ash. All the brands reported in this paper complied with these requirements.

So far there has been no satisfactory quantitative estimation of acetylsalicylic acid. True, various methods have been proposed, but they are objectionable. It was thought that hydrolysis of acetylsalicylic acid and then titrating the solution by comparing the colour formed by  $\text{FeCl}_3$  with that of a standard control might yield interesting results, providing that the conditions were alike. For this purpose 1 Gm. of acetylsalicylic

\* An excess of alcohol destroys or lessens the colour when only a very minute amount of salicylic acid is present.

† The control should be made each time as standing in the air changes its tinctorial power.

‡ This standard is somewhat similar to the one proposed by T. W. Thoburn and Paul J. Hanzlik, *J. Biol. Chem.*, **23**, 1175.

acid was dissolved in 10 c.c. of EtOH and diluted to 1000 c.c. The solution was then heated at 98–100° C. for 2 hours, allowing the EtOH to evaporate, then allowed to stand at room temperature (22° C.) for 22 hours. After adding water sufficient to make 1000 c.c., it was compared colorimetrically for salicylic acid strength. The amount of hydrolysis varied so with different samples under the same conditions, that it was realized that an approximate assay by this method was unreliable. If the assay were made under more exact conditions, quantitative comparisons might be possible.

The general results of the examination of American-made samples show that they are equal to and even superior to those of German origin. (See also *Y.B.*, 1917, 269, 270.)

**Acetylsalicylic Acid and Sodium Salicylate, Determination of, in Powders.** R. Miller. (*Amer. J. Pharm.*, 1917, **89**, 347.) Powders consisting of a mixture of these two ingredients were examined as follows: A weighed quantity of the material mixed with sand was extracted with ten successive washings with Et<sub>2</sub>O. The dry residue from the bulked Et<sub>2</sub>O extract was weighed as acetylsalicylic acid. The portion insoluble in Et<sub>2</sub>O was then moistened with dilute H<sub>2</sub>SO<sub>4</sub> and the acid mixture again extracted with ten successive washings of Et<sub>2</sub>O. The dry residue from the bulked Et<sub>2</sub>O was weighed as salicylic acid. This weight  $\times 1.1651$  gives the equivalent of sodium salicylate of 99.5 per cent. purity or  $\times 1.1593$  the equivalent of the pure salt.

**Acorns, Utilization of, by Alcoholic Fermentation.** K a y s e r. (*Feuille d'Inform. du Minist. de l'Agric.* (France), 1917, **22**, 9–10, through *J. Soc. Chem. Ind.*, 1918, **37**, 277.) Acorns from three varieties of oak (pedunculate, sessile, and holm) found in the Mediterranean district, were freed from their cups, cut into small pieces and heated at 120°–122° C. for half an hour with 2–3 times their weight of water containing 2.5 per cent. of HCl or 1 per cent. of H<sub>2</sub>SO<sub>4</sub>. The residual solid matter was separated from the liquid and completely exhausted by crushing and washing with hot water: and the extract, after partial neutralization with KOH, was seeded with grain yeast or cider yeast. Fermentation commenced in 24 hours, or sooner after addition of 1–2 parts per thousand of sweet rye extract.<sup>1</sup> Dilution of the liquid also accelerated fermentation, owing<sup>2</sup> to the fact that acorns contain considerable amounts of tannin which

retards fermentation. The yield of EtOH varied, according to the variety of plant, the degree of ripeness, and, above all, the dilution of the extract, from 8.58 to 20.16 litres per 100 kilos. of whole acorns (dried), or from 28 to 31 litres per 100 kilos. of dried kernels.

**Acorns and Horse-chestnuts, Examination of.** J. L. Baker and H. F. E. Hulton. (*Analyst*, 1917, **42**, 352.) Four samples of chestnuts and two of acorns gave the following figures :—

	Peeled Chestnuts.				Peeled Acorns.	
	1	2	3	4	1	2
Moisture . . . . .	2.6	3.5	1.85	2.4	1.45	3.32
Ash . . . . .	2.9	2.8	2.45	2.77	2.25	2.70
Matter extracted by ethylic <sup>o</sup> ether (oil) . . . . .	6.1	5.0	7.1	7.2	5.0	4.7
Protein NX 6.25 . . . . .	9.8	10.8	7.25	7.62	6.65	7.5
Reducing sugars as dextrose. . . . .	3.6	9.1	3.29	1.6	4.9	8.18
Cane sugar. . . . .	8.1	11.1	7.27	17.5	1.9	0.1
Starch (Lintner) . . . . .	47.8	21.9	42.8	42.2	57.1	55.7
„ (Taka diastase) . . . . .	38.4	15.2	39.0	38.2	44.3	43.40
Pentosans . . . . .	4.75	—	—	5.44	3.2	—
Crude fibre. . . . .	2.0	—	—	2.6	2.2	2.28
Matter soluble in cold water. . . . .	34.9	48.4	32.56	36.2	13.2	17.24

The discrepancy in the amounts of starch by the Taka diastase method of Davis and the Lintner process is apparently due to the presence of a substance, not starch, which is acted on by cold HCl. Hence the results are probably too high and those obtained with Taka diastase are more accurate. Chestnuts were found to possess considerable diastasic activity. Acorns show practically none. As a source of EtOH, both acorns and horse-chestnuts are of value. The ground nuts were boiled with 2 per cent. H<sub>2</sub>SO<sub>4</sub> under a reflux condenser for 3 hours, then filtered and the filtrate neutralized. The solution of sugar was then fermented for 3 or 4 days with washed brewers' yeast.

	Yield of Alcohol per cent.	
	On Dry Peeled Kernels.	On Nuts as Picked.
Chestnut 1 . . . . .	27	11.5
„ 4 . . . . .	27.3	11.6
Acorn 1 . . . . .	27.5	12.7
„ 2 . . . . .	26.1	12.0

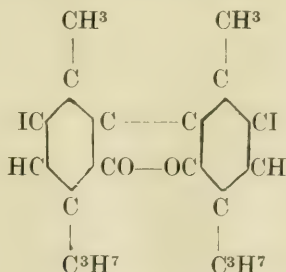
These percentages of EtOH are in agreement with the theoreti-

cal yield as calculated from the sum of the starch, cane sugar, and reducing sugars found by analysis, and are equivalent to a yield of 32 to 36 gallons of absolute alcohol per ton of the nuts as picked.

**Acrolein, New Reaction of.** L. Tsalapatani. (*Anales soc. quim. Argentina*, 1917, **5**, 244-5, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 1034.) Cramer's reagent for detecting acrolein is modified in the following manner: 1 to 2 c.c. of an aqueous solution of resorcinol and several drops of a 10 per cent. NaOH solution are added to the liquid to be tested and the mixture is heated; after about 2 minutes a bluish green colour in the case of dilute solutions and a red colour in the case of concentrated solutions is obtained. The colour disappears when acids (e.g. HCl, AcOH) are added and reappears after addition of alkali; the colour is quite stable in alkaline solution.

**Allantoin, The M.P. of.** H. E. Watt. (*Pharm. J.*, 1917, [4], **45**, 283.) Determinations of the m.p. of allantoin have been made upon the natural product, extracted from comfrey root: upon the artificial, prepared by the oxidation of uric acid, and also upon mixtures of the two—all specimens being carefully purified by several crystallizations—the correct figure is  $235^{\circ}\text{C}$ ., at which point allantoin melts with decomposition. In pharmaceutical works of reference this is given as  $227^{\circ}$  and  $226^{\circ}\text{C}$ . (See also *Y.B.*, 1912, 188, 214.)

**Aristols, Constitution of.** J. Bougault. (*J. Pharm. Chim.*, 1918, **17**, 221.) The theory of Messenger and Vortman that the aristols are hypoiodous ethers of the respective phenols, although widely accepted, is considered to be erroneous. The structure of thymol aristol is probably



and that of similar compounds of other phenols is probably



analogous. Arguments in favour of this are advanced. (See also *Y.B.*, 1892, 499.)

**Phenols, Arsenotungstic Acid as a Reagent for.** L. Gugliamelli. (*Anales soc. quim. Argentina*, 1916, 4, 119, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 664.) The reagent is prepared by dissolving 20 Gm. of Na tungstate in 150 c.c. of water, adding 50 Gm. of pure  $\text{As}_2\text{O}_3$  and boiling under a reflux condenser for 90 minutes. The reagent should be protected from light and may be kept indefinitely. A large number of phenols were tested with this reagent in comparison with Millon's reagent and  $\text{Fe}'''$  alum. To 1-2 c.c. of a dilute solution (1 per mille) of the phenol was added 1-2 c.c. of the reagent, the mixture was shaken for a minute or so and 5-10 c.c. of a cold, saturated aqueous solution of  $\text{Na}_2\text{CO}_3$  were added. A blue colour varying in intensity with the time and concentration was produced. A voluminous precipitate was obtained when  $\text{Ca}(\text{OH})_2$ ,  $\text{Ba}(\text{OH})_2$  or  $\text{LiOH}$  was used instead of  $\text{Na}_2\text{CO}_3$ :  $\text{NH}_4\text{OH}$ ,  $\text{NaOH}$  and  $\text{KOH}$  caused precipitation and the colour produced was unstable. Na phosphate gave good results, but  $\text{Na}_2\text{CO}_3$  was found to be best adapted to the purpose. The colour reaction was positive with diphenols and polyphenols, and was negative with all monophenols except those with multiple function (e.g. both amine and phenolic functions). The reaction was always positive with diphenols such as guaiacol, eugenol and isoeugenol which possess at least 1 free phenol group and which do not contain acid groups (e.g.  $\text{NO}_2$  and  $\text{SO}_3\text{H}$ ); halogens and the  $\text{CO}_2\text{H}$  group caused considerable diminution in the intensity of the reaction. The  $\text{CHO}$  group (e.g. in vanillin) inhibited the colour reaction with the arsenotungstic reagent; hydrocarbon chains appeared to have no influence.

**Phenols, Arsenotungstomolybdic Acid as a Reagent for.** L. Gugliamelli. (*Anales soc. quim. Argentina*, 1916, 4, 183, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 665.) The reagent is prepared by dissolving 20 Gm. of Na tungstate and 4 Gm. of Na molybdate in 150 c.c. of distilled water, adding 50 Gm. of pure  $\text{As}_2\text{O}_3$ , boiling for 90 minutes under a reflux condenser and completing the volume when cold to 200 c.c. The test is made by adding 1-2 c.c. of the reagent to 1-2 c.c. of a dilute solution (1 per mille) of the phenol solution, shaking 2-3 minutes, and adding 5-10 c.c. of a cold, saturated aqueous solution of

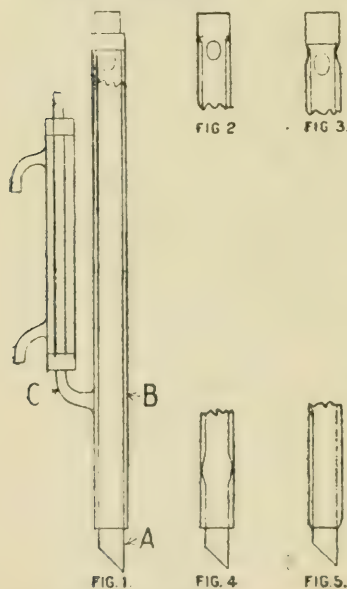
$\text{Na}_2\text{CO}_3$ . The reagent gives various colour reactions with all phenols.

**Atoxyl, Spontaneous Decomposition of, in the Dry Crystalline Condition.** M. François. (*J. Pharm. Chim.*, 1918, **17**, 253.) Attention is directed to the important fact that atoxyl in the crystalline state is by no means stable in tropical climates. It may become decomposed, liberating both  $\text{As}_2\text{O}_3$  and  $\text{As}_2\text{O}_5$ , thus becoming extremely toxic. It is essential therefore that all atoxyl kept for a time in hot climates should be periodically examined on the spot, and specially before administration, to ensure its freedom from these dangerous decomposition products. The author has met with a specimen of atoxyl which being returned to France after three years in the tropics was totally decomposed. The crystals had not altered in form. They were somewhat opaque, which might have been attributed to rubbing and shaking in transit. They were not, however, readily soluble in water, whereas pure atoxyl is soluble 1 : 6. When treated with water, these altered crystals gave a milky solution. When the suspended matter causing this turbidity was collected it proved to be  $\text{As}_2\text{O}_3$ . The clear filtrate gave with  $\text{AgNO}_3$  a brick-red precipitate, characteristic of  $\text{Ag}_3\text{AsO}_4$ ; and a copious precipitate of  $\text{MgNH}_4\text{AsO}_4$  with magnesium mixture. Pure atoxyl gives no precipitate with the latter reagent, and a white precipitate with  $\text{AgNO}_3$ . Quantitative examination showed that the decomposition was complete, the sum of the percentage of  $\text{As}_2\text{O}_3$  and  $\text{As}_2\text{O}_5$  being that of the total As in the molecule of anhydrous atoxyl. In the usual dose of atoxyl, 50 centigrammes, this was equivalent to 3 Cgm. of  $\text{As}_2\text{O}_3$  and 56 Cgm. of  $\text{Na}_2\text{HAsO}_4$ . It is therefore a very dangerous and insidious form of decomposition. The aniline in the molecule is not liberated as such. This phase of the reaction has not yet been worked out. The decomposition is evidently progressive, although it was complete when the samples were examined.

**Benzene, Commercial, Determination of  $\text{CS}_2$  in.** D. Starvorus. (*Zeits. analyt. Chem.*, 1916, **64**, through *Annales Chem. Analyt.*, 1918, **23**, 21.) Twenty-five c.c. of the  $\text{C}_6\text{H}_6$  is mixed with 70 c.c. of EtOH 90 per cent., and 10 c.c. of 8 : 100 solution of NaOH. After 30 minutes, 5 c.c. of strong neutral solution of  $\text{H}_2\text{O}_2$  is added and the EtOH is distilled off on the water-bath. The residue is diluted with 200 c.c. of water,

acidified with  $\text{HCl}$ , and the  $\text{H}_2\text{SO}_4$  present, derived from any  $\text{CS}_2$ , is precipitated as  $\text{BaSO}_4$  in the usual manner and weighed. If desired, the determination may be volumetric. For this purpose a known excess of  $\text{N}/\text{NaOH}$  is used for the formation of xanthogenate from the  $\text{CS}_2$ . After oxidation with  $\text{H}_2\text{O}_2$ , the remaining  $\text{NaOH}$  is titrated with  $\text{N}/5$  acid with methyl orange indicator. Each c.c. of  $\text{N}/\text{NaOH}$  found to be used up = 0.019 Gm. of  $\text{CS}_2$ .

**Boiling Point Determinations, Apparatus for.** A. Edwards. (*J. Soc. Chem. Ind.*, 1918, **37**, 38T.)



enables the entire thermometer stem to be immersed in the vapour of the substance under examination either for b.p. determination or during fractional distillation, and therefore obviates calculations and corrections.

An inner tube, *A* (Fig. 1), about 48 cm. long and 13 to 14 mm. external diameter, is supported by a ring of cork in an outer tube, *B*, of 16 to 17 mm. bore. The inner tube has a hole blown in the side near the top and projects above and below the outer tube. The outer tube has a side limb, *C*, of 7 to 8 mm. bore, fused on 38 to 40 cm. from the top. *C* is bent upwards to form a reflux condenser, the effective length of which is 10 to 15 cm. ;

the water jacket has a diameter of 16 to 17 mm. Wide-mouthed flasks are attached to *B* by corks. The vapour rises in *A*, passes over the thermometer stem, issues by the hole at the top, and descends between *A* and *B*, being finally condensed in *C* and returned to the flask. The return of liquid tends to seal the space between *A* and *B* and secure a regular stream of vapour upwards through *A*. Instead of a cork joint a fused one may be used, as in Fig. 2, or the inner tube may be expanded at the top and supported upon a contraction of the outer tube, as in Fig. 3. The inner tube may be bulbed at the bottom, as in

Fig. 4, or the outer contracted, as in Fig. 5 if the sizes of the tubing available allow too much space between them at this point.

The advantages of this apparatus are : Full immersion of the thermometer stem. The inner current of vapour is protected from draughts by a jacket of vapour. Condensed liquid is returned to the flask below the bulb of the thermometer. Possibilities of superheated vapours are remote. Temperature is maintained steady without fluctuation and without shielding from draughts.

**Butyric Acid, Identification of.** G. Denigès. (*Bull. Soc. Pharm. de Bordeaux*, through *Répertoire Pharm.*, 1917, **28**, 263.) The only simple test by which butyric acid can be identified is its characteristic penetrating odour. The following reaction, based on the oxidation of butyric into diacetic acid by  $\text{H}_2\text{O}_2$  in presence of a ferrous salt as a catalyser, will therefore be useful. To 5 c.c. of the butyric solution add 5 c.c. of  $\text{H}_2\text{O}_2$ , and 1 c.c. of solution of  $\text{Am}_2\text{SO}_4\text{FeSO}_4$  ( $\text{Am}_2\text{SO}_4\text{FeSO}_4$  5 ;  $\text{H}_2\text{SO}_4$ , 14; 10; distilled water to make 100) and heat in the water bath at 68–70° C. for 5 minutes. Then add 6 drops of NaOH solution and after mixing, cooling and filtering, add to the filtrate 3 drops of NaOH and 3 drops of 1 : 20 sodium nitroprusside solution. After mixing, add an excess of  $\text{HC}_2\text{H}_3\text{O}_2$ . On agitating a more or less deep red tint will be produced, varying in intensity according to the amount of butyric originally present. When very small quantities of butyric acid are present the amount of  $\text{H}_2\text{O}_2$  must be proportional to the butyric acid present. If about 1 Gm. per litre 5 c.c. of  $\text{H}_2\text{O}_2$  1 vol. must be used in the above test ; if 5 Gm. per litre then 5 vol.  $\text{H}_2\text{O}_2$  is to be used. It is stated that the results are sufficiently definite to permit of the approximate colorimetric determination of butyric acid by this method.

**Cacao Shell, Colorimetric Detection and Determination of, in Cocoa Powder.** O. Keller. (*Archiv. Pharm.*, 1917, 255, 405, through *Annales Chim. Analyt.*, 1918, **23**, 135.) The  $\text{Et}_2\text{O}$  extract from pure cacao beans is either colourless or very pale yellow. The presence of "cocoa shell" powder imparts a distinct brown shade. Not only is this considered to be sufficiently definite to indicate the presence or absence of "cocoa shell" in cocoa powder, but an approximate quantitative determination can be made. For this purpose a colour standard is prepared



by diluting official liquor ferri perchlor. so that the dilution contains 0.1 Gm. of Fe in 100 c.c. Two Gm. of the powdered cocoa is macerated with 15 c.c. of  $\text{Et}_2\text{O}$  in a closed vessel for 24 hours with frequent agitation. Ten c.c. of the liquid is removed and filtered several times through a small filter containing 0.2 Gm. of kieselguhr until quite clear; then more ether is poured over the filter so as to obtain 15 c.c. of filtrate, which is collected in a colorimeter tube. The colour is then matched with the freshly prepared  $\text{FeCl}_3$  colour standard. A pure cocoa, with shell, containing 54.0 per cent. of fat, requires 2.4 c.c. of this solution. With less fat less colour will naturally be required. Cocoa shell powder requires from 3.5 to 5 c.c.

**Carbon, Detection of, in Inorganic and Organic Substances.** E. Mueller. (*J. prakt. Chem.*, 1917, **95**, 53-4, through *J. Chem. Soc.*, 1917, **112**, II, 269.) A mixture of approximately 0.02 Gm. of the substance under investigation with roughly 20 times its weight of  $\text{KN}_3$  is cautiously heated, at first gently and then, finally, for 2 minutes at a red heat. KCN is formed, and may be recognized in the usual way by conversion into Prussian blue. The test, which may be rendered still more delicate by the additional presence of a little metallic K in the reaction mixture, may be applied to organic and inorganic matter.

**Chloroform, New Test for.** — U t z. (*Apoth. Zeit.*, through *J. Pharm. Chim.*, 1918, **17**, 49.) To 10 c.c. of the  $\text{CHCl}_3$  a small quantity of benzidine is added, and gently shaken until dissolved. It is then set aside for 24 hours in the dark. If the  $\text{CHCl}_3$  is pure, no change will occur. In presence of 0.01 per cent. of carbon oxychloride a turbidity will be evident, or a yellow precipitate if the impurity amounts to 0.1 per cent. If free Cl is present, a pink colour will be seen, which turns blue. If HCl is present, the benzidine mixture at once becomes turbid. (See also *Y.B.*, 1907, 245; 1911, 123; 1912, 168; 1913, 188; 1915, 152, 285; and *Gen. Index*.)

**Chloroform, New Reaction for the Detection of.** K. Fujiwara. (*Sitz. Nat. Ges. Rostock*, 1916, **6**, 33, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 3201.) If to a reagent, prepared by mixing 3 c.c. of a 10 per cent. solution of NaOH with about 2 c.c. of pyridine and heating to boiling, 1 c.c. of a liquid containing even a trace of  $\text{CHCl}_3$  is added, the mixture at once assumes a bright blue-red colour. This pyridine test,

like the isonitrile, resorcinol, and naphthol tests, also responds to chloral hydrate,  $\text{CHBr}_3$ ,  $\text{CHI}_3$  and several other substances. This test detects 1 part of  $\text{CHCl}_3$  in 1 million of water, 500,000 of  $\text{Et}_2\text{O}$ , or 300,000 of  $\text{EtOH}$ . It is equally sensitive toward chloral hydrate,  $\text{CHBr}_3$ , or  $\text{CHI}_3$ . An  $\text{Et}_2\text{O}$  extract of 5 c.c. of fresh blood containing 1/500,000 c.c.  $\text{CHCl}_3$  gives a sharp pyridine reaction. The distillate of an  $\text{EtOH}$  extract of the organs of a guineapig which had received 0.005 c.c. per kilo of  $\text{CHCl}_3$  by inhalation, or 0.0025 c.c. by intravenous injection, and of a dog receiving 0.033 c.c. per kilo in gelatin capsules by the mouth, responded positively to the pyridine test. Guinea-pigs which had received 0.015 c.c. per kilo were killed and the bodies kept in a cold room for 7 weeks when an extract of the bodies gave a positive reaction to this test. Contrary to the findings of Wagener, Vitali, and others,  $\text{CHCl}_3$  was found in the urine of 15 persons after  $\text{CHCl}_3$  anaesthesia.

**Cresols, Deodorizing, for Disinfectants.** J. F. Couch. (*Amer. J. Pharm.*, 1918, **91**, 128.) Sulphonating the cresols is recommended to remove the odour, without interfering with the disinfectant value. The product has the further advantage of being soluble in water. Equal weights of crude cresol and strong  $\text{H}_2\text{SO}_4$  are slowly mixed. After thorough stirring the mixture is heated to  $75^\circ$ – $110^\circ \text{C}$ ., not exceeding the higher temperature, until a drop of the liquid dissolves in water with only faint turbidity. The length of time necessary for complete sulphonation varies with the quality of the cresol, from 7 to 14 hours. The reaction mixture is then mixed with 5 volumes of cold water. Any oily matter which separates should be removed. The diluted mixture is neutralized with milk of lime, and allowed to stand for 24 hours for  $\text{CaSO}_4$  to separate. The clear liquid is decanted, the precipitate washed by decantation and the aqueous portion evaporated to dryness on the water bath. The dry residue is redissolved in a little water, and if still odorous, again evaporated to get rid of naphthaline or pyridine. When the residue is practically odourless, it is diluted with water to twice the volume of the original cresol, and the Ca present precipitated as  $\text{CaSO}_4$  by means of  $\text{H}_2\text{SO}_4$ , great care being taken to avoid excess of the latter. After standing for a day, the liquid is filtered and may be adjusted to any desired volume by addition of water. In practice this may be the same volume as the original cresol taken. The product is a

golden yellow liquid with a faintly acid reaction. It is claimed that phenol-coefficient against *B. coli* is considerably increased by this treatment. No addition of soap is required in preparing disinfectants as the Ca salts present are all soluble in water.

**Ergotoxine Ethyl Ester, Supposed Formation of, from Ergotine.** G. B a r g e r and A. J. E w i n s. (*J. Chem. Soc.*, 1918, 113, 235.) Further investigation shows that the crystalline substance described as the phosphate of ergotoxine ethyl ester (*Y.B.*, 1910, 21) is not so, but is merely the phosphate of ergotine itself.

**Ether, Test for Methyl Compounds in.** D. B. D o t t. (*Pharm. J.*, 1917, [4], 45, 283.) In a former note (*Y.B.*, 1917, 273) the variation in results obtained from different samples of commercial fuchsin was discussed, as also the effect of temperature in the preparation of the test solution; at that time specially prepared specimens, to compare with the commercial dyes, were not available. Specially prepared rosaniline hydrochloride and pararosaniline have since been obtained, and from these preparations test solutions were made according to the official directions. Calling the special samples R and P, and the best commercial sample C, the following results were obtained:—

With  $\text{Et}_2\text{O}$  containing 0.5 per cent. (vol.) of wood spirit: violet blue after 20 minutes; R, faint; P, fairly strong; C, strong coloration. With  $\text{Et}_2\text{O}$  containing 0.2 per cent. (vol.) of wood spirit: R, very faint; P, distinct; C, quite decided. It is thus evident that deficiency in delicacy in the reaction in question does not indicate defective preparation, still less any adulteration of the sample. If the test is to be retained and placed on a satisfactory basis, the fuchsin employed would require to be standardized against a solution of some Me compound. It might be stated that the test solution of fuchsin when applied in the prescribed manner to pure  $\text{Et}_2\text{O}$  mixed with 0.2 per cent. of its volume of wood naphtha of Excise standard must give a distinct violet blue colour in 10 minutes. It might be more convenient to employ the official solution of formaldehyde as a means of testing the sensitiveness of the fuchsin solution. The limit of the colour reaction has not been determined, but with 0.01 c.c. of the B.P. solution there is a strong violet colour in less than 20 minutes. It should be noted that the solution of pararosaniline had a persistent colour in itself, which interferes with its value as a test. The colour was not removed by adding a little more bisulphite. In testing the weak formaldehyde

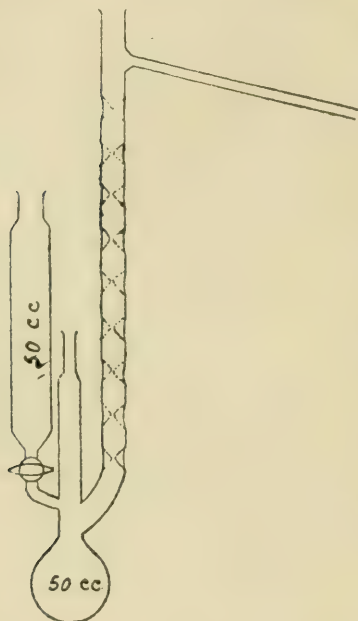
solution the difference between the R and C was not so marked as in tests with  $\text{Et}_2\text{O}$  containing wood spirit, but still in favour of the sample C, while sample P was appreciably stronger in reaction than R.

**Fruit Acids, Nature of.** W. D. Bigelow and P. B. Dunbar. (*J. Ind. Eng. Chem.*, 1917, **9**, 762.) The records of previous investigations on the identity of the acids contained in fruits, which are very fully summarized, show most conflicting statements. Doubtless identification was, in many cases, erroneous due to the tests employed. The authors are therefore reinvestigating the subject in the laboratories of the U.S. Department of Agriculture. The results obtained, so far, are not regarded as final, and the work is being continued. The following is a summary of the acids found in the fruits examined : *Apple* : Malic acid only. *Banana* : Probably malic only. *Cantaloupe* : Malic none—probably all citric. *Cherry* : Malic only. *Cranberry* : Citric probably predominates—malic also present. *Currant* : Citric probably predominates—malic sometimes present. *Gooseberry* : Malic and citric. *Peach* : Probably malic only. *Pear* : Malic only in some varieties ; citric probably predominates in others with small amounts of malic. *Persimmon* : Probably malic only. *Plum* : Malic only. *Pomegranate* : Probably all citric—no malic nor tartaric. *Quince* : Malic only—no citric. *Raspberry (red)* : Probably citric only—malic, if present, in traces only. *Water-melon* : Malic, no citric. Undoubtedly traces of acids other than those here considered occur in many fruits and it is possible that these may sometimes be found in important quantities. The results obtained on pears emphasize the danger of drawing general conclusions as to the acid content of fruits from the analysis of a limited number of varieties or even of a limited number of samples. It is believed, however, that the general conclusions drawn from those cases in which a considerable number of samples were examined are correct.

**Fractional Distillation under Diminished Pressure, Efficient Apparatus for.** W. A. Noyes and G. S. Skinner. (*J. Amer. Chem. Soc.*, 1917, **39**, 2718.) The simple appliance figured may be easily made from apparatus ordinarily found in the chemical laboratory, the essential parts being a separatory funnel, a Claissen bulb and a fractionating column. The apparatus offers the advantages : (1) that it may be used advantage-



ously with either small or large fractions of material by regulating the flow of the entrant fraction from the funnel, and (2) that the successive fractions may be introduced without losing



the vacuum. In case bulbs are used as receivers a wide mouth stopcock may be introduced into the side tube to serve the second purpose. The fractionating column may be made from tubing of convenient size by softening the glass at the proper points in the small flame of a blast lamp and indenting with the point of an iron wire. The points thus made should almost touch, and each successive pair of indentations should be at right angles to the preceding. The column used in the apparatus had 34 pairs of indentations in a length of 25 cm.

#### Glycerin, Modified Bichromate, Method for Determination

of. E. Little and B. C. Fennner. (*J. Am. Leather Chem. Assoc.*, 1917, 12, 254, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2314.) Weigh out 1 Gm. of a 90 per cent. glycerin (more if the percentage is less). Wash into a small beaker with about 100 c.c. of water. Add in small portions a saturated solution of basic Pb acetate, letting the solution settle after each addition until no further precipitate forms. Filter into a 250 c.c. flask. Add 12 c.c. of saturated  $\text{AgC}_2\text{H}_3\text{O}_2$  solution to precipitate chlorides, then enough 15 per cent.  $\text{H}_2\text{SO}_4$  to precipitate excess of Pb and silver. Make up to 2 mm. above the mark, mix thoroughly and filter into a glass-stoppered flask. From the approximate glycerol content, calculate the amount of  $\text{K}_2\text{Cr}_2\text{O}_7$  necessary to oxidize the glycerol in a 25-c.c. portion of the solution. Weigh 0.2 to 0.3 Gm. more than this amount of  $\text{K}_2\text{Cr}_2\text{O}_7$  into a 1 Gm. Erlenmeyer flask. Run in 25 c.c. of glycerol solution, 25 c.c. of water and 25 c.c. of strong  $\text{H}_2\text{SO}_4$ ,

adding the acid slowly while rotating the flask. If the solution turns blue, add more  $K_2Cr_2O_7$ , or take a fresh portion with more  $K_2Cr_2O_7$ . Place the flask, covered with a watch-glass on the steam bath for 30 minutes. Cool. Dilute to about 500 c.c. Add 25 c.c. of 1 : 1 HCl, 15 c.c. of 10 per cent. KI solution and titrate with 0.2 N or 0.1 N  $Na_2S_2O_3$ , with starch indicator. Calculate glycerol equivalent to excess  $K_2Cr_2O_7$ ; (1 Gm.  $K_2Cr_2O_7$  = 0.1341 Gm. glycerol), and subtract this from the equivalent of total  $K_2Cr_2O_7$  taken, expressing result as percentage glycerol in sample. (See also *Y.B.*, 1906, 39 : 1907, 72 : 1909, 148, 260 ; 1915, 158 ; 1916, 193.)

**Glycerin Obtainable from Whale Oil, Quality of.** A. H. Salway. (*J. Soc. Chem. Ind.*, 1918, 37, 123A.) The best varieties of whale oil yield glycerin equal in quality to that from vegetable oils, such as may be safely used for the manufacture of dynamite glycerin. Medium quality whale oils yield distilled glycerin containing minute quantities of trimethyleneglycol and nitrogenous matter. The amount of impurity is, however, too small to affect the glycerin deleteriously. Very inferior whale oils are unsuitable for the production of dynamite glycerin. Such oils may be recognized by their high nitrogen content and high percentage of free fatty acid and by the fact that distilled glycerin prepared from them gives a precipitate with phosphotungstic acid in the presence of 5 per cent.  $H_2SO_4$ .

**Gossypol, the Toxic Constituent of Cotton seed.** T. R. Carruth. (*J. Amer. Chem. Soc.*, 1918, 40, 647.) Gossypol occurs in peculiar glands called "gland dots," "secretion cavities," or "resin glands" which are present in all parts of the cotton plant except the woody tissue. These are 100 to  $400\mu$  in diameter and are readily visible to the eye. They appear to be of lysigenous origin, i.e. formed by disintegration of adjacent cells. The author obtained a crude material from an ether extract of the bark which evidently was chiefly gossypol. It was not obtained crystalline. The glands, wherever they occurred, gave the characteristic red colour reaction with strong  $H_2SO_4$ , from which it is inferred that they contain gossypol. The amount in the undried kernels, near free from lint and hulls, is about 0.6 per cent. Three methods have been employed for the extraction of gossypol.

(1) The crushed kernels, from which the greater part of the lint and hulls was removed by sifting, were extracted with

petroleum ether or gasoline. The dried residue was then extracted with  $\text{Et}_2\text{O}$ . The concentrated gossypol extract thus obtained is treated with  $\frac{1}{2}$  to  $\frac{1}{3}$  its volume of glacial  $\text{HC}_2\text{H}_3\text{O}_2$ . On standing most of the gossypol crystallizes out as "gossypol acetate." The crystalline paste is then sucked off and washed with small amounts of glacial  $\text{HC}_2\text{H}_3\text{O}_2$ , and then with petroleum ether. For further purification the gossypol acetate thus secured is dissolved in  $\text{Et}_2\text{O}$  and  $\text{HC}_2\text{H}_3\text{O}_2$ —about 10 parts to 1 part of gossypol—is added. The  $\text{Et}_2\text{O}$  is then in part distilled until the gossypol begins to separate readily. For the preparation of crystalline gossypol from the "acetate" the latter is dissolved in  $\text{Et}_2\text{O}$  and water is added. The ether is distilled leaving the gossypol as crusts floating on the water which contains all the  $\text{HC}_2\text{O}_3\text{O}_2$ . The free gossypol may then be crystallized from  $\text{EtOH}$  or other suitable solvent.

(1a) In this method the kernels are not previously extracted with petroleum ether, but with  $\text{Et}_2\text{O}$  only. The evaporated ether extract is treated with acetic acid and allowed to stand until the gossypol "acetate" separates out. This requires a much longer time than in method 1.

(2) This method depends on the insolubility of the alkali salts of gossypol in oil. The extracts from method 1 are shaken with a slight excess of  $\text{NaOH}$  solution. The  $\text{Na}$  salts of gossypol and of the free fatty acids pass into the aqueous layer on separation. This is the method used commercially in refining crude cottonseed oil. It is not satisfactory for the experimental isolation of gossypol since that body quickly oxidizes in alkaline solution.

(3) This method involves the use of aniline as a precipitating agent. A very slightly soluble compound, apparently the dianiline salt of gossypol, is formed, which separates out of an oily extract on standing as an orange-yellow micro-crystalline precipitate. Aniline (about 5 per cent. of the weight of the extract) is added to an  $\text{Et}_2\text{O}$  extract of cottonseed. The mixture is warmed on the water bath and set aside to stand a week or more. If given sufficient time the yield is practically quantitative and the method has been used to estimate the amount of gossypol in extracts of cottonseed products. The aniline-gossypol compound is filtered out and washed free from oil, etc., with  $\text{Et}_2\text{O}$ , or with a small amount of ether followed by larger amounts of petroleum ether. It may be purified by recrystallization from aniline. To prepare gossypol from the

aniline compound it is dissolved in hot alcoholic KOH and the aniline is steam-distilled out. The resultant aqueous solution of potassium "gossypolate" is treated with a pinch of sodium hyposulphite ( $\text{Na}_2\text{S}_2\text{O}_4$ ) in order to reduce any of the blue oxidation product which may be formed. The gossypol is then precipitated in amorphous flocks by acidifying. It may be filtered out or removed from the solution by shaking with  $\text{Et}_2\text{O}$  in a separator funnel. It may be purified according to method 1.

Gossypol forms a very stable molecular compound with acetic acid, which does not lose its acid on boiling with water, or readily at temperatures below  $180^\circ$ . It is this compound that Marchlewski named "gossypol." The author attributes the formulae  $\text{C}_{30}\text{H}_{28}\text{O}_8$  or  $\text{C}_{30}\text{H}_{30}\text{O}_9$  to free gossypol, a number of compounds, decomposition products and salts of which are described. Very little gossypol is found in hot pressed cottonseed meal. In the "cold pressing" process at least three-fourths of the gossypol of the seed passes into the oil. Such oil was found to contain 1.5 per cent. of gossypol. On treatment with alkali any gossypol present in the oil is removed and passes into the foots. Since crude oil is always thus treated, no gossypol or related pigment is ever found in the refined edible oil. Since the non-occurrence of gossypol in hot pressed oil is contrary to what might be expected and since it does not occur in actually cold pressed oil it may be well to explain the difference. Actual cold pressure squeezes out the oil from the oil cells without allowing it to dissolve gossypol from the "resin glands." Hence the gossypol remains in the press cake. In the commercial "cold pressing" process the seed is heated to a considerable extent and the material is subjected to a grinding, pulverizing action under great pressure so that the glands are broken up and the contents taken up by the hot oil and removed mostly from the cake. In the hot pressing process as ordinarily conducted under the moist cooking conditions the gossypol glands are disintegrated by the moisture and stirring and the contents stream out and are spread over the seed tissue, where the gossypol is subjected to oxidizing influences. It is not clear why so little passes into the oil, but perhaps the seed tissue holds the gossypol and its oxidation product—"D" gossypol—much as cloth holds a dye, or possibly some chemical combination may take place. If rather dry seed is used the gossypol is apparently not so readily converted to this less soluble, less toxic oxidation product but remains in part as such in the meal. Such a meal is more toxic



than a properly cooked meal. In these cases gossypol may be extracted with  $\text{Et}_2\text{O}$  and the amount estimated by the aniline method. It is interesting to note that gossypol in crude oil behaves much the same as free fatty acid. This was shown by dissolving some gossypol in neutral cotton oil, after which alkali was required to render the oil again neutral to phenolphthalein. (See also *Y.B.*, 1916, 193.)

**Gossypol, the Toxic Substance in Cottonseed.** W. A. Withers and F. E. Carruth. (*J. Agric. Res.*, 1918, **12**, 83, through *J. Soc. Chem. Ind.*, 1918, **37**, 164A.) Feeding experiments have been conducted with rats, rabbits, and pigs. Cottonseed meal is much less toxic than raw cottonseed, probably owing to oxidation of the gossypol during the cooking in the preparation of the meal. Feeding experiments with small pigs in pens showed that cottonseed meal is definitely injurious but that the  $\text{Et}_2\text{O}$  extracted raw seed does not appear to cause cottonseed meal poisoning. Gossypol is toxic to pigs. In addition to this toxic effect a diet of cottonseed meal and corn (maize) meal has nutritive limitations which may lead to failure of pigs to thrive in pens, this result being, however, quite distinct from cottonseed meal poisoning. This poisoning may be postponed or averted in the case of pigs by outdoor exercise, access to forage and soil, and improved diets. (See also *Y.B.*, 1916, 193.)

**Horse-chestnuts, Use of, for the Production of Alcohol.** K a y - s e r. (*Feuille d'Inform. du Minist. de l'Agric. (France)*, 1917, **22**, 10, through *J. Soc. Chem. Ind.*, 1918, **37**, 277A.) Fermentation experiments indicated that 100 kilos of dry horse-chestnuts will yield 27-28 litres of alcohol, which, though lower than the yield obtainable from maize, would warrant their industrial use under present conditions.

**Horse-chestnuts, Constituents of.** A. G o r i s. (*Comptes rend.*, 1917, **165**, 345.) The brown testa contains aesculin and a tannin and is of no industrial value. The kernel contains 2-3 per cent. of fat, 6-7 per cent. of nitrogenous matter, and 20-30 per cent. of starch, besides bitter substances of the saponin group and colouring matters, but contrary to the statements of some authors it contains neither aesculin nor tannin. The oil is of no interest industrially, and as it forms an obstinate emulsion with the saponins, extraction is only practicable after

these have been largely destroyed or transformed by desiccation or fermentation. Owing to the pharmacological activity of the saponins, and their bitter flavour, pulp or flour obtained from the kernel cannot be used as foodstuff without a treatment to remove them. For this purpose the author recommends washing with dilute acid, e.g. a 0.1 per cent. solution of HCl, by which treatment yields of 20–25 per cent. of white, odourless and tasteless flour have been obtained in the laboratory. The starch grains are irregular, some being small, rounded or ovoid, others bulky, pear-shaped or ellipsoidal, with a well-marked linear or stellate hilum. The striae are not very distinct. The starch might serve for the production of EtOH or even as food. Factories for the production of starch from horse-chestnuts were formerly installed in the neighbourhood of Paris, but they were not remunerative, owing to the cost of labour and of transport of the raw material.

**Hydrocyanic Acid, Detection and Determination of Minute Quantities of.** P. S a v i a l l e and L. V a r e n n e. (*J. Pharm. Chim.*, 1918, 17.)

The authors have modified their method published two years ago (*Y.B.*, 1916, 196). The shaking out with Et<sub>2</sub>O is abandoned, and polysulphide solution of calcium substituted for AmHS. The solution containing the HCN in the form of a soluble salt is treated in a small deep glass capsule with sufficient calcium polysulphide solution to colour it distinctly yellow. After 15 minutes' contact in the cold, the capsule is transferred to a cold water bath, which is gradually heated to boiling. As the colour in the liquid fades it is brought back by the addition of 1 drop more of the reagent. In this manner the yellow tint is preserved until a dry residue is obtained. When cold this is taken up with 5 c.c. of water, acidified with 5 drops of dilute H<sub>2</sub>SO<sub>4</sub>, when effervescence and precipitation of S occur. CaCO<sub>3</sub> is then added until no further CO<sub>2</sub> is given off, a slight excess of CaCO<sub>3</sub> being added to aid filtration. After filtering, the precipitate is washed and the clear filtrate evaporated to dryness on the water bath. When quite cold this residue is treated with 1 c.c. or less of water, and 4 drops or less of dilute H<sub>2</sub>SO<sub>4</sub> and 1 drop of FeCl<sub>3</sub> reagent (FeCl<sub>3</sub> solution, sp.g. 1.260 1 part; water, 9 parts) or of a 1 : 20 solution of pure Fe<sub>2</sub>SO<sub>4</sub>. In presence of HCN a red colour of greater or less intensity proportionate to the amount of HCN present will be developed. As little as 0.00001 Gm. is easily found, and it is claimed that

0.000005 Gm. can be detected thus. If desired the coloured liquid can be shaken out with  $\text{Et}_2\text{O}$ , to which it will impart a violet tint. To determine the amount of HCN present the red reaction liquid is titrated drop by drop with N/100 or N/500  $\text{Ag}_2\text{SO}_4$  until the red colour is discharged. The volume of the N/100 or N/500  $\text{Ag}_2\text{SO}_4$  used exactly corresponds to the equivalent volume of HCN solution of the same strength.

**Hydrocyanic Acid, Detection and Determination of Small Amounts of.** I. M. Kolthoff. (*Pharm. Weekblad*, 1917, **54**, 1157-71, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 30.) Comparison is made of the various analytical methods in current use for CN compounds. The sensitiveness is expressed, in Mgm. of CN per litre, for the following qualitative reactions: Prussian blue, 1; thiocyanate, 0.1; picric acid, 1; guaiacum resin, 0.004; phenolphthalein, 0.1 to 0.05;  $\text{AgCN}$ , 1 to 0.03; starch iodide, 0.1. The Prussian blue and thiocyanate tests are specific for HCN; but with the latter care must be taken that no CNS is present in the sample. Several substances give the picric acid test, so a negative is more significant than a positive result. The guaiacum test, though the most sensitive, has little or no value, since various oxidizing agents give the test in absence of HCN, and various reducing agents mask the true HCN reaction. The phenolphthalein test is better; its chief disturbing factor is  $\text{H}_2\text{S}$ , which is easily removed as  $\text{CdS}$ . The  $\text{AgCN}$  test is reliable with proper precautions against the presence of halogens. The starch iodide test can be made specific for HCN by acidifying the aqueous distillate after the decolorization; return of the blue colour means the presence of  $\text{CN}'$ . With proper precautions, all these methods can be made quantitative except the guaiacum test. (See also *Y.B.*, 1907, 80; 1910, 155; 1911, 157; 1914, 136; 1915, 161; 1917, 135.)

**Iodine as a Microchemical Reagent for Formaldehyde and Hexamethylenetetramine.** C. van Zijp. (*Pharm. Weekblad*, 1918, **55**, 45.) An aqueous solution of I in KI (1 : 1 : 100) is a very sensitive reagent for  $(\text{CH}_2)_6\text{N}_4$  in  $\text{EtOH}$ , forming a precipitate composed chiefly of small yellow rhombs, with radial outgrowths of crystal skeletons. These show a play of colours between crossed nicols. Some smaller rhombic or hexagonal brown crystals are also observed. Formaldehyde is detected by converting to  $(\text{CH}_2)_6\text{N}_4$  with  $\text{AmOH}$ , driving off excess  $\text{AmOH}$  and treating with the reagent.

**Iodine, Determination of Small Quantities of, in Organic Substances.** W. Lenz. (*Sitzb. Konig. preuss. Akad.*, 1916, 1028, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2003.) Ten Gm. of air-dried powdered material was moistened with 10 c.c. of 10 per cent. alcoholic KOH, the EtOH burnt off, and the residue carefully carbonized, keeping the crucible below red heat. The black residue was triturated with about 10 c.c. of water and the mixture heated on the steam bath, and filtered into a 100 c.c. flask with the mark at 20 c.c. The carbonized residue was washed with hot water until free from alkali, and the washings filtered, combined and evaporated to dryness. The residue was taken up with water containing a few drops of  $\text{H}_2\text{SO}_4$  and added to the main portion in the calibrated flask. The solution was then diluted to the 20 c.c. mark with water and carefully acidified with dilute  $\text{H}_2\text{SO}_4$ . Three c.c. of  $\text{CS}_2$  and 2 drops of "Nitrose"  $\text{O}_2\text{N}.\text{SO}_3\text{H}$  (prepared by saturating strong  $\text{H}_2\text{SO}_4$  with the gases liberated by the interaction of  $\text{As}_2\text{O}_3$  and 48 per cent.  $\text{HNO}_3$ ) were then added to the solution and the mixture thoroughly shaken. I (which is freed according to the reactions:  $\text{O}_2\text{N}.\text{SO}_3\text{H} + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 + \text{HNO}_2$ ,  $\text{HI} + \text{HNO}_2 \rightarrow \text{I} + \text{NO} + \text{H}_2\text{O}$ .) is taken up by the  $\text{CS}_2$ . After standing the aqueous layer was carefully removed by means of a pipette and the  $\text{CS}_2$  layer washed with two successive portions of water. The combined aqueous solutions which still contained small amounts of I were shaken with 2 c.c.  $\text{CS}_2$  and 2 drops of "Nitrose," the  $\text{CS}_2$  layer washed cautiously with water until neutral to litmus, and combined with the main portion of  $\text{CS}_2$ -I solution. The combined  $\text{CS}_2$  solutions were then treated with 3 c.c. of a solution containing 5 Gm. of  $\text{NaHCO}_3$  and 1 c.c. of 25 per cent. HCl per litre of water, and titrated to disappearance of the violet colour with N/100 hypo. The latter was standardized by titrating the I freed from an aqueous standard KI solution after treatment with  $\text{CS}_2$ , "Nitrose," etc., identical with that used in the case of the aqueous extracts of the original material. The amount of KI used in the titration experiment should be nearly equal to the amount of KI present in the original. This greatly lessens the error due to the incomplete extraction of the I from the  $\text{H}_2\text{O}$  solution by  $\text{CS}_2$ . (See also *Y.B.*, 1911, 412; 1913, 174; 1914, 116; 1916, 170; 1917, 102, 103; and *Gen. Index*.)

**Iodo-starch Reaction, Sensitiveness of.** A. W. Lorenz.



(*Chem. Analyst*, 1916, **19**, 20-1, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 1934.) Deducting a blank in I titrations for the purpose of correcting errors introduced by various impurities, volume of solution very often increases the actual error. Since the sensitiveness of the I-starch reaction is increased by the presence of HI or a soluble iodide, the difference is caused not so much by impurities as by the absence of HI or iodides. In running the blank care should be taken that the concentration of HI or iodide (pure KI free from  $\text{KIO}_3$  should be used) is the same as that of the actual determination. If the blank is run without KI the error may amount to 0.2 or 0.3 c.c. in an ordinary titration.

**Male Fern Extract, Determination of Filicin and Filicic Acid in.** — Perrin. (*Ann. Chim. analyt.*, 1918, **23**, 55.) Five Gm. of the extract is dissolved in 40 c.c. of  $\text{Et}_2\text{O}$  and the solution is shaken out with 100 Gm. of 3 per cent.  $\text{Ba}(\text{OH})_2$  solution; after settling for 10 minutes, the aqueous layer is drawn off, filtered, 86 Gm. of the filtrate is acidified slightly with HCl, and shaken out with  $\text{Et}_2\text{O}$  (40, 30, 20, and 15 c.c.). The  $\text{Et}_2\text{O}$  extracts are filtered, evaporated, and the residue dried at  $100^\circ \text{C}$ . for 2 hours, and weighed. The weight obtained  $\times 25 =$  the percentage of crude filicin present. The extract should contain from 24 to 25 per cent. To determine filicic acid, the dry crude filicine is treated with 2 c.c. of amyl alcohol; after 24 hours, 20 c.c. of pure MeOH is added, at first drop by drop until a permanent precipitate is formed, and the remainder then poured in. The precipitate is collected after 24 hours, washed twice with 5 c.c. of MeOH, dried at  $100^\circ \text{C}$ ., and weighed. The yield should be from 3.5 to 9 per cent. (See also *Y.B.*, 1916, 377; 1917, 313.)

**Micro-analysis by means of Textile Fibres.** E. M. Chamot and H. I. Cole. (*J. Ind. Eng. Chem.*, 1918, **10**, 48.) *Detection of boron by means of turmeric viscose-silk fibres.* To dye the fibres, a solution of turmeric is prepared by boiling about 20 Gm. of ground turmeric with 50 c.c. of EtOH and adding to the filtered solution an equal volume of water and 0.5-1 c.c. of 10 per cent. NaOH solution. The fibres are immersed in this solution, which is then evaporated to a syrupy consistence on a water bath. The fibres are removed and immediately dipped in EtOH 95 per cent., pressed between filter paper, dipped in dilute  $\text{H}_2\text{SO}_4$ , washed with water, and dried. Of all fibres tested, viscose-silk gives by far the best colour reaction. To

apply the test, a drop of solution of the material to be tested is placed on a micro slide and acidified with dilute HCl. In this drop a turmeric fibre is placed, and the liquid evaporated carefully to complete dryness. The fibre is examined under the microscope. A rose or violet-rose colour indicates boron. To confirm, a drop of a 1 per cent. solution of NaOH is placed upon the fibre. The rose colour immediately turns to Prussian blue, changing to violet. Care must be taken that boron is not present in the glass slip and that strong bleaching agents such as  $\text{H}_2\text{O}_2$  or hypochlorites are destroyed in the original substance.  $\text{H}_3\text{BO}_3$  can be distinguished from borates in the absence of inorganic salts capable of decomposing a borate by omitting the addition of the HCl.  $\text{H}_3\text{BO}_3$  gives the characteristic colour, but borates fail to do so. A drop of a solution containing 0.000025 Mgm. of boron gives a positive test by this method.

*Detection of the heavy metals by means of ZnS wool fibres.* Wool, defatted by treatment with a mixture of EtOH and  $\text{Et}_2\text{O}$ , is soaked overnight in a 1 per cent. solution of NaOH. It is then washed and dipped five or six times alternately in solutions of 10 per cent.  $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2$  and 10 per cent.  $\text{Na}_2\text{S}$ , pressing but not washing between the dippings. The wool is then washed and dried between filter papers. A drop of the solution to be tested is placed on the object slide, a drop of dilute HCl added, a treated wool fibre introduced, and examined under the microscope. The solution is then evaporated to dryness, a drop of dilute AmOH added, and the fibre examined again, a new fibre also being placed in the drop. The colour of the fibre indicates the following metals: Straw-yellow—Sn; lemon-yellow—As, Cd; orange—Sb; reddish-brown—Bi; brown or yellow-brown—Pt, Cu, Hg, Sb (sometimes Co, Fe, Mn, Ni); black (brown in very dilute solutions)—Ag, Pb, Au, Hg. Colourless in acid solution, in alkaline solution the fibre may be brown or yellow-brown if Co, Fe, Mn, or Ni is present. The colour in all cases depends to a certain extent upon the quantity of metal present.

**Micro-detection of Acids or Alkalis, Use of Textile Fibres for.** E. M. C h a m o t and H. I. C o l e. (*J. Ind. Eng. Chem.*, 1917, 9, 969.) Silk fibres, previously treated with 10 per cent. NaOH solution for 2 hours at the ordinary temperature and then washed, are dyed with concentrated litmus solution, washed, treated with very dilute  $\text{HC}_2\text{H}_3\text{O}_2$  solution or NaOH solution, and again

washed. Fibres thus prepared form very sensitive indicators for the detection of acids or alkalis in minute drops. The fibre is so placed that a part of it is not moistened by the solution, and this serves for comparison when the drop is observed under the microscope. A  $N/4500$  solution of a mineral acid gives a distinct reaction with the fibres, but the reaction with alkalis is not quite so sensitive. The litmus used in preparing the fibres must be purified. Fibres dyed with Congo-red are useless for differentiating organic acids from mineral acids. [This method will suggest the use of other reagents in a similar manner.—Ed. *Y.B.*]

**Nitriles, Sensitive Reaction for.** S. De z a n i. (*Atti. Accad. sci. Torino*, 1917, **52**, 826, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2649.) The test depends upon the formation of HCN by oxidation of nitriles. To the nitrile solution (1–5 c.c. in a test tube) add an equal volume of  $H_2O_2$  (12 vol. O) and 2–3 drops 5 per cent. solution of  $FeCl_3$  or  $Fe_2(SO_4)_3$ . The acidity of commercial  $H_2O_2$  is sufficient to create favourable conditions for the reaction. Close the tube with a cork with a small hole to allow of escape of steam or gas. The stopper holds suspended a strip of soda-picric acid paper (filter paper moistened with a 1 per cent. picric acid solution, dried, and immersed in a 10 per cent.  $Na_2CO_3$  solution). Heat the tube to boiling. According to the amount of nitrile present, the presence of HCN liberated will be indicated instantly or within 2–3 minutes by its odour, or by the production of Prussian blue in the liquid if the nitrile is in appreciable quantity, or by a pink, red or red-brown coloration of the paper if the amount is very small. Nitriles both of the aliphatic and aromatic series respond to the test. Using 1 c.c. of solution the reaction will indicate by a pink colour the presence of 0.00002 Gm. nitrile (expressed as a function of the HCN which it will yield theoretically). In a solution of 1 : 100,000 nitrile, the test will be positive if 2 c.c. are used. In absence of HCN the strip of filter paper will sometimes take on a brownish coloration from unknown causes, but after some hours this disappears or weakens; while on the other hand, the brownish colour due to HCN continually intensifies or is permanent.

**Oleum Picis Rectificatum; Spirits of Tar.** L. Archbutt. (*Pharm. J.*, 1918, [4], **46**, 71.) The author has previously met with samples of rectified tar oil adulterated with petroleum.

The iodine value of this was only 59. The iodine value of two apparently genuine specimens was 208 and 217 respectively. Two other adulterated samples containing 70 and 59 per cent. of light petroleum also had the low iodine value 23.4 and 33.6. The iodine absorption test appears to be of considerable service in the valuation of this product.

**Oleum Picis Rectificatum.** E. J. Millard. (*Pharm. J.*, 1918, [4], 46, 28.) Attention has recently been directed to this substance by litigation, in which it was attempted to include the hydrocarbon distillates obtained from coal tar under the synonym "spirits of tar." It was held, however, that the oil of wood tar was the article so designated. The author confirms this definition.

A gallon of a specimen of Stockholm tar submitted to steam distillation gave only a few ounces of oil; sp.g. 0.921. American wood-tar oil, similarly treated, yielded nearly 40 per cent. of brown oil. This, when treated with NaOH and redistilled gave a colourless oil with a faint terebene-like odour; sp.g. 0.881;  $n_D^{20} + 3^\circ$ ; flashing at  $124^\circ$  F. The B.P.C. gives the sp.g. as being 0.840 to 0.870, and suggests redistillation "several times." The above results show that this treatment is not necessary; and that there is no advantage in obtaining a product with a sp.g. lower than 0.880. It is stated that commercial samples of low gravity have been found to be adulterated with petroleum spirit.

**Picric Acid, Picrotoxin and Phenazone, Micro-detection of, in the Stas Otto Process.** O. Tunmann. (*Apoth. Zeit.*, 1917, 32, 441, 447, through *J. Chem. Soc.*, 1918, 114, [II], 139.) Picric acid and picrotoxin occur in the  $\text{Et}_2\text{O}$  extract obtained by shaking out the acid original solution. Some phenazone is also removed, but the greater part is obtained only after the original solution has been made alkaline with AmOH.

*Picric Acid.*—The micro sublimates are homogeneous, colourless, or even yellow. Typical crystals cannot be reckoned on even after recrystallization from water or EtOH. HI dissolves the sublimate at once, but no crystals are formed.  $\text{ZnCl}_2$  dissolves rich sublimates only on warming; on cooling, large yellow prisms and flat prismatic crystals are deposited; they show strong pleochroism and extinction parallel to the long axis.  $\text{BrKBr}$  solution acts similarly, but the prisms are less regular and not pleochroic. On the whole, reactions like the



isopurpuric<sup>1</sup> acid reaction, the picramic acid reaction, and the dyeing of wool are most satisfactory for these microchemical purposes.

*Picrotoxin*.—The picrotoxin sublimes at 215–225° C. for the most part. The sublimate exhibits no crystals, but only drops, and crystallization could not be brought about.  $\text{ZnCl}_2$  and  $\text{HI}$  yield no reaction products.  $\text{HNO}_3$  dissolves the sublimate, but produces no coloration. Rich sublimates yield good crystals of picrotoxin when treated with  $\text{HCl}$ , but it is better to apply 1 : 20  $\text{FeCl}_3$  solution for this purpose, because this distinguishes picrotoxin sublimates from those of antipyrine. The sublimate and the solution are heated under a cover glass until bubbles appear; on cooling, typical pentagonal tablets can be observed. They are colourless, the large ones polarize in variegated shades and show oblique extinction. If the sublimate under the cover glass is treated with a drop of  $\text{Br-KBr}$  solution and heated, colourless prisms of bromopicrotoxinin are formed on cooling. These crystals are monoclinic, and can also be obtained by the action of bromine water.

*Phenazone*.—The residues from the  $\text{Et}_2\text{O}$  extraction of the acid solution yield only traces of antipyrine, because the greater quantity of this substance is extracted only when the solution is alkaline. The sublimates at first consist of drops, which eventually form groups of radially arranged, flat, prismatic crystals, which polarize strongly. These phenazone deposits yield deep red drops with  $\text{HI}$ , shining droplets with  $\text{ZnCl}_2$ , and droplets also with  $\text{Br-KBr}$  solution. The colour reactions ordinarily used are evident even with the smallest quantities without the aid of a microscope. Two phenazone reactions which yield decisive crystalline precipitates are to be found in the formation of nitrosoantipyrine and ferripyrine respectively. In the former case, the sublimate is dissolved in a drop of water and treated successively with a drop of 1 : 10  $\text{NaNO}_2$  solution and a drop of  $\text{HC}_2\text{H}_3\text{O}_2$ . The green solution deposits doubly refractive dichroic crystals, or, if it is heated, long yellow prisms. The ferripyrine reaction is carried out by heating the sublimate with a drop of 1 : 20  $\text{FeCl}_3$  solution under a cover glass until bubbles are formed; on cooling, orange-yellow crystals are deposited, mostly 30–50 $\mu$  (sometimes 80 $\mu$ ) long, which show yellow shades in polarized light. The reaction distinguishes phenazone from salipyrine. In the case of salipyrine the sublimate consists of groups of bent needles. Addition

of  $\text{FeCl}_3$  gives a violet solution, permanent on heating, and no crystals are deposited unless a too high temperature has been used for subliming. In this case a mixture of crystals of ferripyrine and salicylic acid are obtained.

**Pyramidone, New and Delicate Test for.** L. Gugliamelli. (*Anale soc. quim. Argentina*, 1916, 4, 180-2.) The author's (see p. 148) arsenotungstic reagents, when added to an aqueous solution of pyramidone, gave white precipitates which are soluble in alkali with production of intense blue and indigo colours, respectively; white precipitates soluble in alkali without production of colour were obtained in the case of anti-pyrine. An appreciable coloration was observed with the arsenotungstomolybdic reagent and pyramidone in 1 : 750,000 dilution; no coloration whatever was detected with anti-pyrine in even 10 per cent. concentration. This reaction is of value in detecting very small amounts of pyramidone and phenols.

**Salicylic Acid in Foods, Determination of.** H. D. Steenberg. (*Chem. Weekblad*, 1917, 14, 914, through *J. Soc. Chem. Ind.*, 1918, 38, 346A.) A round-bottomed flask containing 66 c.c. of  $\text{C}_6\text{H}_6$  and a few pieces of tile is connected with an extraction apparatus containing 50 c.c. of  $\text{C}_6\text{H}_6$  to which an amount of the material under examination equivalent to about 5 Mgm. of salicylic acid is added, together with 2 c.c. of N/4  $\text{H}_2\text{SO}_4$ , a little EtOH, and just sufficient water to cause the EtOH to run over. The whole is connected with a condenser and the extraction carried on for 6 hours. After cooling, a few c.c. of  $\text{C}_6\text{H}_6$  from the extractor are shaken with water and a drop of  $\text{FeCl}_3$  solution (1 in 1000). If this gives no salicylic acid reaction the whole of the  $\text{C}_6\text{H}_6$  is shaken in a separating funnel with two separate 5 c.c. of N/10 KOH and then washed with water. The resulting united aqueous extracts are evaporated to dryness and the residue transferred by means of 10 c.c. of N/10 HCl and 20 c.c. of water to a long-necked stoppered flask. To this are added 1 c.c. of HCl (sp.g. 1.13) and 10 c.c. of a solution containing 1.67 Gm. of  $\text{KBrO}_3$  and 6 Gm. of KBr per litre, a blank test being performed at the same time. After a quarter of an hour 6 c.c. of N/2 KI and 1 c.c. of  $\text{CHCl}_3$  are added to each, and the liberated I is titrated with N/80 hypo.

**Starch Indicator, Permanent.** (*Pharm. Zeit.*, 1917, [157])

through *Schweiz. Apoth. Zeit.*, 1917, **55**, 421.) Water, 225 c.c., is boiled with  $\text{HgI}_2$  0.1 Gm. Starch, 2.5 Gm., previously rubbed smooth with water 25 c.c. is poured into the hot liquid and shaken up. The mixture is then cooled in running water and filtered. This will not develop moulds or bacteria.

**Tannic Acid, Gallic Acid, and Pyrogallol, Preparation of.** M. Mit o. (*J. Chem. Ind. Tokyo*, 1917, **20**, 720-37, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 473.) Experiments with Japanese galls are reported. *Extraction of tannin from galls.* The galls were extracted twice with 4 times their volume of water at 20-30° C. and the residue was pressed. The 13 per cent. tannin solution obtained represented a yield of 82 per cent. of the theoretical. *Preparation of tannic acid:* The extract was concentrated to 20 per cent. by gentle heating and then extracted with half its volume of  $\text{Et}_2\text{O}$ . The  $\text{Et}_2\text{O}$  solution was evaporated and the tannin obtained as a powder; yield about 75 per cent. of that extracted with water. *Preparation of gallic acid:* This was prepared from the residual solution of the tannic acid preparation. The solution was concentrated to 20 per cent. by heating gently at first and afterwards boiling briskly for 5 to 6 hours. About 15 to 20 per cent. of the volume of  $\text{H}_2\text{SO}_4$  (sp.g. 1.84) was added to the solution, the precipitated black mass redissolved in water, decolorized with animal charcoal and finally crystallized from water. The yield was 62 per cent. of the total tannins contained in the residual solution used. *Preparation of pyrogallol:* The crude gallic acid was treated in an autoclave with about three times its volume of water and heated at 210° C. The crude product was purified by recrystallization from  $\text{C}_6\text{H}_6$ . The yield was 63.5 per cent. of the gallic acid.

**Tartrates, Test for, by the Formation of the Copper-Tartrate Complex.** L. J. Curt man, A. Lewis, and B. R. Harris. (*J. Amer. Chem. Soc.*, 1917, **39**, 2623.) To 5 c.c. of the solution is added 3 c.c. of a 2.5 per cent. solution of  $\text{NaOH}$  and 1 c.c. of  $\text{N}/5 \text{ CuSO}_4$ . The volume is made up to 10 c.c. and the mixture shaken for 1 minute. The mixture is then filtered, the filtrate acidified with 50 per cent.  $\text{HC}_2\text{H}_3\text{O}_2$ , one drop of  $\text{K}_4\text{FeCy}_6$  solution added, and the difference noted after 1 minute. According to the quantity of tartrate present, a pink coloration or a reddish-brown precipitate makes its appearance. It is possible to detect 0.2 Mgm. of tartrate in this way and the use of  $\text{K}_4\text{FeCy}_6$ .

in place of  $\frac{1}{2}$ AmOH, makes the test appreciably more sensitive. Solutions which contain ammonium salts, arsenites, borates, or phosphates give a positive reaction in the absence of tartrates. If the quantity of tartrate is small, the reaction is observed in the presence of thiosulphates, arsenates, chromates, fluorides, thiocyanates, nitrites, oxalates, and acetates.

**Veronal, Acetanilide, Salicylic Acid and Phenacetin, Micro Identification of, in course of Stas-Otto Method of Toxicological Investigation.** O. T u n m a n n. (*Apoth. Zeit.*, 1917, **32**, 289, 298, through *J. Chem. Soc.*, 1917, **112**, [II], 551.) The micro-chemical identification of the above-mentioned substances extracted from acid solution by shaking out with  $\text{Et}_2\text{O}$  is effected as follows :—

*Veronal*.—Zinc chloriodide is added to the sublimate of the residue beneath a cover glass. Numerous small flat tabular and prismatic stable crystals are at once formed up to  $40\ \mu$  long and  $20\ \mu$  wide ; these vary in colour from pale grey to blackish red, optically biaxial, having extinction parallel to the long axis and show strong pleochroism. Acetanilide and salicylic acid do not react with zinc chloriodide. Veronal sublimate is dissolved by HI, and crystals are slowly deposited at the edges of the solution ; these are relatively large (up to  $150\ \mu$  long and  $50\ \mu$  wide), flat, red, or sometimes grey, optically biaxial, have direct extinction, and shine red between crossed Nicols. With KBr and Br solution, a red colour is developed, due to a mixture of flesh-coloured and red needles and leaflets, which polarize strongly and show direct extinction and very marked pleochroism. They attain a length of  $50\text{--}80\ \mu$ , whilst, also, very small groups of yellow crystals are formed. The red crystals disappear in course of time, whilst the yellow are more stable. If the veronal sublimate is dissolved in ammoniacal Cu solution and the latter allowed to evaporate, a mixture of pink to violet lamellae and coarse plates is obtained, which shines in polarized light. The plates belong to the monoclinic system, are optically biaxial, and have oblique extinction.

*Acetanilide*.—Well-formed crystals are obtained by sublimation and recrystallization from water. With HI, reddish-brown drops are formed immediately, from which crystals of iodoacetanilide separate after a few minutes. These are strongly dichroic (reddish-brown and pale yellow), and show extinction parallel to the long axis. They are stable. Bromoacetanilide



is prepared by the addition of KBr and Br solution to the sublimate dissolved in hot water; a yellow solution results, from which, on addition of water, colourless crystals separate. These consist of fine needles, which are transformed partly into prismatic aggregates and partly into small, monoclinic crystals. The isonitrile test, the identification of aniline after hydrolysis, and certain colour reactions can also be performed.

*Salicylic Acid*.—Sublimation can be effected without decomposition of the acid into  $\text{CO}_2$  and phenol. Better crystals are obtained after solution of the sublimate in water. They consist of prismatic rodlets and coarse, generally rectangular prisms, which belong to the monoclinic system, polarize in all colours, and have oblique extinction. The sublimate was tested with  $\text{FeCl}_3$ ,  $\text{HNO}_3$ , and Millon's reagent, and also converted into the methyl ester (recognized by odour). If the sublimate is treated with ammonia, the solution allowed to evaporate, and  $\text{AgNO}_3$  added to the moist residue, a mixture of crystals is formed containing well-developed, oblique prisms of silver salicylate. The latter are up to  $100\ \mu$  long and  $15\ \mu$  wide; they polarize strongly, and have oblique extinction (monoclinic).

*Phenacetin*.—The sublimate should be recrystallized from water, from which the phenacetin separates in two forms. The first of these consists mainly of flat prisms with oblique ends, at which twin-formation is frequently evident; they are  $15\text{--}20\ \mu$  wide and  $100\text{--}150\ \mu$  long. The subsidiary form comprises very long, flat, rectangular prisms, which invariably exhibit strong, oblique grooves. The oblique and rectangular prisms have oblique and direct extinction respectively. All the crystals polarize strongly. Platelets, as with acetanilide, are not formed. Characteristic nitrophenacetin crystals are prepared by mixing the sublimate with water and nitric acid and warming without cover-glass until a yellow rim is formed. Groups of yellow needles soon separate, which polarize strongly between crossed Nicols; slender needles, prisms, or long, flat, rectangular crystals with direct extinction are also produced. When similarly treated, salicylic acid, acetanilide, or antipyrine yield only a colourless rim and white crystals. The phenacetin sublimate does not give the carbylamine reaction. The tests with HI and KBr and Br solution are also described.

**Oxalic Acid in Foods and Condiments, Quantitative Determination of.** E. Arbenz. (*Mitt. Lebensm. Hyg.*, 1917, 8, 98–104,

through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2374.) Heat 10–20 Gm. of the dry, powdered substance in an Erlenmeyer flask on the water bath with 150 c.c. of 15 per cent. HCl (sp.g. 1.074). Cool, and filter into a graduated cylinder, press the residue gently, and note the volume of clear brown filtrate obtained. Transfer to a porcelain dish, and evaporate almost to dryness, then take up with 20 c.c. of water, and extract 24 hours with Et<sub>2</sub>O. Evaporate off Et<sub>2</sub>O, and wash the residue into a beaker with hot water. Cool, add AmOH almost to neutrality, make acid with AcOH, precipitate hot with CaCl<sub>2</sub> solution, let stand for 12 hours, filter and wash with hot water. Dissolve the precipitate in 6 c.c. of warm 15 per cent. HCl, filter, and wash, using about 80 c.c. of water. Add to filtrate CaCl<sub>2</sub> solution, a drop of phenolphthalein, precipitate hot with 10 per cent. NH<sub>4</sub>OH, and again acidify with 10 per cent. AcOH. Repeat this operation until the precipitate appears on micro examination to be pure, then ignite and weigh. The following is the amount *per mille* of H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> found in the substances named: Black tea 14.3, cocoa 4.8, pepper 4.5, rhubarb 3.2, spinach 2.9, sorrel 2.7, dry figs 1.2, roasted coffee 0.8, roasted chicory 0.7, raspberries 0.5, beans 0.45, potatoes 0.4, beet 0.3, currants 0.3, pears 0.2, bilberries 0.2, oranges 0.1, asparagus 0.09, cherries, tomatoes and wine grapes 0.68, cauliflower 0.06, onions 0.05, Brussels sprouts 0.04, endive and melons 0.03, mushrooms, peaches, flour, lemons, celery, plums, and apples, a trace; corn meal, rice, and chestnuts, none.

**Vinegar, Trade Numbers of.** C. A. Mitchell. (*J. Soc. Chem. Ind.*, 1918, **37**, 148A.) It has been incorrectly stated in works of reference that the numbers 24 to 16 under which vinegar is sold, indicate the number of grams of Na<sub>2</sub>CO<sub>3</sub>·10H<sub>2</sub>O which one ounce of the fluid will neutralize. The true origin of the terms seems to be the price paid for the gallon of vinegar. There is no uniformity in the strength of the vinegar sold under the same number by different makers. Thus, "No. 16" vinegar has been sold at strengths varying from 3.5 to 5 per cent. of acetic acid, and "No. 24" vinegar at strengths varying from 5.2 to 6 per cent.

## PLANT ANALYSIS

**Ambrosia artemisiaefolia, Analysis of Pollen of.** F. W. Heyl. (*J. Amer. Chem. Soc.*, 1917, **39**, 1470.) *Ambrosia artemisiaefolia*, the American ragweed, is one of the weeds responsible for the severe epidemics of hay fever which attack American cities in the autumn. To collect the pollen for analysis, the roots of the plants were kept in water, the inflorescences being enveloped loosely in paper. The pollen grains collected during several days were sifted and dried *in vacuo* over  $H_2SO_4$ , when they lost 8.2 per cent. This material gave no reaction for starch with iodine. Micro examination showed the pollen to be in the 3 nuclear stage. From a haemocytometer count it was calculated that 610,000,000 cells were required to give 1 Gm. of pollen. This dried material gave the following analytic figures: Alcoholic extract, 42.9; moisture, 5.3; crude fibre, 12.2; pentosans, 7.3; ash, 3.4; dextrin, 2.1; protein, 24.4 per cent. Of the protein about 7.5 per cent. could not be extracted, while 6.75 per cent. was extracted with dilute alkali. Only about 5 per cent. was soluble in 1:10 NaCl solution. The nitrogen in the alcoholic extract probably occurs in a base. The alcohol extract also contains lecithin, fat, sucrose, glucose, and resin. A characteristic ophthalmic reaction was obtained with two averagely susceptible hay-fever patients with 0.000001 to 0.000005 Gm. of the pollen protein.

**Arsenic and Manganese, The Presence, Distribution, and Rôle of, in Plants.** F. Jadin and A. Astruc. (*Rev. sci.*, 1916, **54**, 589, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 591.) Summarizing the more general results of recent and former investigations, the authors state that all the organs of all plants analysed by them showed the presence of both As and Mn. The former was present in rather small proportion in a number of plants named, and the latter in larger proportion in a few. The chlorophylliferous portions generally contained more than the subterranean parts, and the content of the leaves varied sensibly with age. No preponderant influence is exerted by the soil content of As or Mn on the percentage of those substances found in the plants which take what they require, even, if necessary, through the medium of the plants on which they are parasitic. Vegetable foods constitute, if not the only source, at least one of the most important of the sources of the Mn and As

normally found in animal tissues. It is concluded that As and Mn are of the greatest importance in the vegetable cell, the former exerting an influence comparable to that of P, the second favouring the O reactions in the plant. (See also *Y.B.*, 1913, 165, 175; 1914, 110, 116.)

**Apios Fortunei, Toxic Principle of.** K. Iwamoto. (*Jap. P.J.*, 1917, [426], 8.) A case of poisoning directed attention to the desirability of chemical investigation of the root of this leguminous plant, which grows wild in Hokkaido in Japan, where it is used as a remedy for coughs. The author, in a preliminary examination, has isolated, by the Stas-Otto method, a crystalline alkaloidal substance which appears to be the active principle.

**Bignonia leucoxylon Wood, Substance accompanying Lapachol in.** O. A. Oesterle. (*Arch. Pharm.*, 1916, 254, 346, through *J. Chem. Soc.*, 1917, 112, [1], 505.) The author has isolated from the wood of *Bignonia leucoxylon*, in addition to lapachol, a very small quantity of a substance,  $C_{29}H_{26}O_4$ , colourless needles, m.p. 222–223° C., darkening at 215°, which is not volatile with steam, is insoluble in alkali hydroxides or carbonates, and develops a bluish-violet coloration with strong  $H_2SO_4$ . It is certainly not lapachonone, which not infrequently accompanies lapachol in woods. (See also *Y.B.*, 1915, 191.)

**Calcium, Micro-detection of, in Plant Tissue.** H. Mollisch. (*Berichte Deut. Bot. Ges.*, 1916, 34, 288, 363, through *J. Chem. Soc.*, 1917, 112, [2], 387.) Treatment of a plant section containing dissolved or undissolved Ca compounds with a drop of semi-saturated aqueous KOH leads to the gradual formation of characteristic, hexagonal plates or discs, which may change later into crystalline aggregates resembling flowers. The crystals consist of the double salt,  $2CaCO_3 \cdot 3K_2CO_3 \cdot 6H_2O$ . This test is rendered more rapid and certain if the KOH solution (1 vol.) is mixed with saturated  $K_2CO_3$  solution (1 vol.). The reaction takes place with  $CaCO_3$ ,  $CaSO_4$ ,  $Ca(NO_3)_2$ ,  $Ca_3(PO_4)_2$ ,  $CaC_2O_4$  and other organic salts of Ca. One of the most sensitive reactions for the microchemical detection of Ca in plant tissue consists in treatment with concentrated aqueous  $Na_2CO_3$  solution (from 10 per cent. to an almost saturated solution), which results in the precipitation of sodium calcium carbonate (gaylussite) crystals. The rapidity and abundance with which the



crystals are formed increase with the concentration of the  $\text{Na}_2\text{CO}_3$  solution employed.

**Citrus decumana Fruit, Some Constituents of.** H. F. Zoller. (*J. Ind. Eng. Chem.*, 1918, **10**, 364.) *Essential Oil.*—The fresh peel of the American grape fruit when steam distilled under slightly reduced pressure, yielded from 0.4 to 1.1 per cent. of greenish yellow, fragrant essential oil, in character between lemon and orange oils. Sp.g., 0.845 to 0.860;  $n_{D20} + 72.5$  to  $+ 78.5$ ;  $n_{D20}$  1.4750 to 1.4785. The oil contained the following constituents in the percentages enumerated: Dextro-limonene, 90 to 92; citral, 3 to 5;  $\alpha$ -pinene, 0.5 to 1.5; linalol, 1 to 2; geraniol, 1 to 2; with some citronellal and linalyl and geranyl esters.

*Naringin.*—The bitter glucoside present in the peel was identified as naringin  $\text{C}_{21}\text{H}_{16}\text{O}_{11} + 4\text{H}_2\text{O}$  when air-dried. This glucoside was originally discovered by de Vry in the residual orange flowers after distilling neroli oil. It forms creamy white, very bitter fluffy monoclinic crystals sparingly soluble in water at  $20^\circ$ , only 1 : 8000, yet this solution is intensely bitter;  $n_D$ , in EtOH,  $- 65.2$  at  $20^\circ\text{C}$ . Naringin disappears from stored grape fruit. When fresh, it amounts to 0.62 per cent., in old market specimens it fell to 0.08 per cent. It may be extracted from the peel by means of EtOH 95 per cent. The solvent being distilled off the residue is extracted with a large volume of water, filtered, and the filtrate treated with basic lead acetate. Excess of Pb is removed by means of  $\text{H}_2\text{S}$ . On evaporating the aqueous filtrate naringin crystallizes out. The pulp of the fruit contained citric acid, sucrose, dextrose, and pectose.

**Chemical Constituents of Lophopetalum toxicum, Erythrophloeum densiflorum, Quisqualis indica, Tylophora brevipes, Toddalia asiatica, Lunasia amara, Rourea erecta, and Hymenodictyon excelsum.** H. C. Brill and A. H. Wells. (*Philippine J. Sci.*, 1917, **12**, 167.) The following named Philippine plants were examined in the Organic Chemistry Laboratory of the U.S. Bureau of Science, Manila, for physiologically active constituents with the results noted.

*Lophopetalum toxicum* contains a saponin which is poisonous in small quantities. The bark of the tree is used by the natives as an arrow poison. The crystalline saponin extracted by the authors, was fatal when administered by injection to guineapigs. (See also *Y.B.*, 1915, 109.)

*Erythrophloeum densiflorum* contains tannins, but no substances with any marked physiological properties. (See also *Y.B.*, 1905, 202 ; 1909, 34 ; 1913, 221 ; and *Gen. Index.*)

*Quisqualis indica* contains an oil in the seeds which has purgative properties ; a gum in the stems, which is inactive physiologically, but gives some of the chemical tests of the alkaloids ; and a considerable amount of  $K_2SO_4$ . The kernels of the seeds proved to have a mild laxative action when eaten. The oil, clear yellow, extracted from them with  $Et_2O$ , had the following characters : Sp.g., 0.9075 at  $30^\circ C.$  ;  $n_{D^{30}}$  1.4585 ; optically inactive ; saponification value, 187.97 ; iodine value (Hanus), 66.49 ; Reichert Meissl value, 1.4 ; acetyl value, 3.787. The yield was 28.37 per cent. of the nuts. Ten c.c. had a purging action on an adult. The oil was devoid of any anthelmintic properties.

*Tylophora brevipes* contains an alkaloid identical in properties with tylophorine found by Hooper in *Tylophora asthmatica* growing in India. The natives employ a decoction of the fresh or dried roots as a prompt emetic. Like *T. asthmatica* it may usefully be prescribed for this and other purposes. (See also *Y.B.*, 1890, 130 ; 1891, 165, 166.)

*Toddalia asiatica* contains the alkaloid berberine. Although the root is much used as a tonic in the East, and is official in the Indian Pharmacopoeia, the Philipinos do not employ it medicinally. (See also *Y.B.*, 1912, 107, and *Gen. Index.*)

*Lunasia amara* contains an alkaloid identical in properties with lunasine found by Boorsma in *Lunasia costulata* in Java. The bark of this species has been confused with that of *Lophopetalum toxicum*, and investigations published previous to the work of Boorsma in 1900 supposed it be on *Lunasia* bark, were really concerned with *Lophopetalum* bark wrongly named as *Lunasia* or *Rabelaisia*. The rabelaisine of Plugge should therefore be called lunasine. The tree is known locally as "paitan." Contrary to published statements the authors are unable to find any evidence of *Lunasia* being used by the Philipinos as an arrow poison. Although when administered by hypodermic injection to the guineapig the alkaloid produced great weakness, the animal recovered. When 0.8 Gm. was administered by the mouth to a dog the same symptoms with slowing of the heart and somnolence were evident. The animal quickly recovered. (See also *Y.B.*, 1897, 138.)

*Rourea erecta* is a physiologically active poison toward the

Carnivora, but inactive toward the Herbivora ; the active principle could not be isolated, but further attempts will be made to isolate this when larger quantities of material are available. The bark and berries are reputed to have many therapeutic properties and to be emetic and poisonous. It has been named "palo santo" by the Spaniards. The authors found 5 Gm. administered to a dog to be fatal in 38 hours.

*Hymenodictyon excelsum* contains  $\beta$ -methyl-aesculetin. It differs from *H. excelsum* of India, since the latter contains aesculin, according to Broughton, while Naylor claims to have found an alkaloid, which has been named hymenodictyonine by him. (See also *Y.B.*, 1886, and *Gen. Index*.)

**Diphenol, Wide Occurrence of, in Plants.** J. Wolff and Nadia Rouchelman. (*Ann. inst. Pasteur*, 1917, **31**, 96, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2480.) A phenol which behaves like pyrocatechol in giving a blue colour with starch-KI solution in the presence of AcOH and laccase is met with in the juices and extracts of a large number of plants. It resembles pyrocatechol further in a number of properties such as the formation of a precipitate with  $\text{FeCl}_3$ , which turns blue and which becomes violet on the addition of a drop of  $\text{NH}_3$  solution ; it gives a red colour with Millon's reagent. The blue colour is only rarely obtained from the tissues or juices of plants by the direct addition of the starch-KI solution. Even when all of the factors entering into the reaction are known to be present, the colour change is sometimes not obtained. The presence of traces of tannin exert an inhibitory action and sometimes the colour change is prevented by the too rapid oxidation of the oxidizable substances by the laccase from the plant itself. To avoid these disturbing factors, the following method is followed : The plant tissues are crushed in the presence of dilute  $\text{H}_2\text{SO}_4$ , which paralyses the action of the laccase. Young plants are selected whenever this is possible and the tests are made preferably on the leaves. The plants are ground with their own weight of  $\text{N}/2 \text{ H}_2\text{SO}_4$ . When the material has been reduced to a pulp, it is filtered. After neutralizing the  $\text{H}_2\text{SO}_4$  with  $\text{Na}_2\text{HPO}_4$  crystals (or with  $\text{CaCO}_3$  when tannin is present, in which case it is necessary to refilter) the fluid is divided into two equal parts, one portion to serve as the control. To one portion, 2 drops of a glycerinated maceration of *Russula delica* which is rich in laccase is added, then each portion receives

successively 0.25 c.c. of 3 per cent. starch-KI solution and 3 drops of N/AcOH. The fact that the blue colour is not produced in the absence of laccase excludes all possibility that it is dependent on nitrites.

**Gentiana germanica, Organic Crystalline Substances in.** H. Molisch. (*Ber. Deut. bot. Ges.*, 1917, **35**, 653, through *J. Chem. Soc.*, 1918, **114**, [1], 247.) The occurrence of two distinct crystalline substances in the leaves of *Gentiana germanica* have been detected by microchemical examination. The first of these is obtained as a sublimate of yellow needle-like crystals when the dry leaves are subjected to microsublimation at moderate temperatures. This compound, to which the name *gentiolutein* is given, is insoluble in water, EtOH, glycerin, aqueous chloral hydrate, olive oil, or in 10 per cent. solutions of  $\text{H}_2\text{SO}_4$ , HCl, or  $\text{HC}_2\text{H}_3\text{O}_2$ , but is easily soluble in acetone. In  $\text{Ba}(\text{OH})_2$  and  $\text{Ca}(\text{OH})_2$  solutions, the crystals become deep brown and also give a transitory, bright bluish-green colour with  $\text{CaCl}_2$  solutions. Gentiolutein occurs not only in the leaves, but also in the stems and flowers of the above species, but could not be detected in *G. asclepiadea*, *G. ciliata*, or *G. pneumonanthe*, although *G. ciliata* yielded a colourless, crystalline substance, which, however, differed from gentiolutein in its relations to the various solvents. A second crystalline substance may be observed when, after removal of the epidermis, the leaf is immersed in distilled water, or when it is treated with 10 per cent. solutions of HCl,  $\text{H}_2\text{SO}_4$ , or  $\text{HNO}_3$ , or with phenol, EtOH, or glycerin. Evidence is adduced to show that neither of the substances observed is identical with gentiopierin or gentianin.

**Gyranocladus canadensis Seeds, Analysis of.** G. N. Watson and L. E. Sayre. (*J. Amer. Pharm. Assoc.*, 1917, **6**, 601.) The "Kentucky coffee" tree occurs from South and West Canada to Nebraska and Kansas. The roasted seeds are often eaten by children and appear to be harmless, but the raw seeds are stated to be poisonous, and fatal results are stated to have followed their ingestion. The authors have found that the seeds contain a saponin, and a toxalbumin similar to ricin. It is to these constituents that the effects of the raw seeds are attributed. An analysis of the seeds gave results as follows: Ash, 4.25 per cent.; moisture, 8.76 per cent.; material by acid conversion, calculated as starch, 16 per cent.; sugar, by direct polarization, 18.40 per cent.; reducing sugar, none; proteid ( $\text{N} \times 6.25$ ),



30.43 per cent. ; fixed oil, 20.12 per cent. ; wax and resinous matter, 2.10 per cent. An examination of the oil showed constants as follows : Saponification value, 195.09 ; iodine number, 135.21 ; refractive index at 20° C., 1.4750 ; colour, bright yellow ; taste, bland. The characters of this fixed oil are similar to those of devil's claw and walnut oils.

**Ginger, Chemical Characters and Decomposition Products of Thresh's "Gingerol."** A. Lapworth, L. K. Pearson, and F. A. Royle. (*J. Chem. Soc.*, 1917, 111, 777.) From the alcoholic extract of African ginger there was separated a refined "gingerol," constituting a viscous faintly yellow phenolic oil, the further purification of which proved difficult. It was therefore converted by methyl sulphate and alkali into crystalline "methylgingerol,"  $C_{18}H_{28}O_4$  or  $C_{19}H_{30}O_4$ , needles, m.p. 64° C. ;  $[\alpha]_D^{20} = +27.3$ , in  $CHCl_3$ . This substance on treatment with hydroxylamine gave a hydrated oxime, and also appeared to contain a OH group. Gingerol, when oxidized with  $CrO_3$ , formed *n*-heptoic acid and probably *n*-hexoic acid, whilst on treatment with  $Ba(OH)_2$  it yielded *n*-heptaldehyde and zingerone,  $C_{11}H_{14}O_3$ , a ketonic phenolic substance crystallizing in needles, plates, or rhombohedra, m.p. 31°–34° C., which was further converted into its phenylhydrazone, m.p. 143° C. ; semicarbazone, m.p. near 133° C. ; ethylcarbonate derivative,  $C_{11}H_{13}O_2 \cdot O \cdot CO_2C_2H_5$ , prisms, m.p. 45°–47° C., and methyl derivative, colourless needles, m.p. 55.5°–56.2° C. ; the last possessed no phenolic properties but yielded an oxime,  $C_{12}H_{17}O_3N$ , needles, m.p. 91–92° C., and reacted with  $NaBrO$  giving  $CHBr_3$  and  $\beta$ -3.4-dimethoxyphenylpropionic acid, whence it is probable that methylzingerone is to be represented as



$CH_3O \text{---} \langle \text{cyclohexane ring} \rangle \text{---} CH_2 \cdot CH_2 \cdot CO \cdot CH_3$ . Gingerol itself must be essentially a mixture of optically active saturated phenolic compounds derived from zingerone in association with a molecular proportion of the residue of an aliphatic aldehyde, the chief being *n*-heptaldehyde ; the constituents of the mixture are probably aldols of the general type :



**Ginger, Pungent Principles of.** J. Grier. (*Pharm. J.*, 1917, [4], 45, 172, 205, 216.) After summarizing the recently

published results (see p. 180) the following details are given of the three chief constituents of ginger.

*Gingerol*, the pungent principle of ginger, is an intensely pungent, viscid, clear, faintly yellow, inodorous oily liquid,  $\alpha_D + 12.9^\circ$ . It is a mixture of homologous substances, e.g.  $C_{17}H_{26}O_4$  and  $C_{18}H_{28}O_4$ , molecular weights 294 and 308 respectively, and capable of distillation *in vacuo*,  $135^\circ$ – $140^\circ$  C. (Lapworth), or under reduced pressure,  $227$ – $229^\circ$  C. at 6 mm. (Nelson),  $240$ – $250^\circ$  C. at 18 mm. (Garnett and Grier). Nelson states that this distilled oil is not quite so pungent as the original gingerol, and it has also apparently lost its optical activity. It is soluble in most organic solvents, and in acetic acid, fats, and volatile oils, also in weak EtOH 35 per cent. w/v and in weak alkali 1 per cent., but not in ammonia or in alkaline carbonate, or to any extent in water. Soluble slightly in cold petroleum ether, more so in hot, but quickly separating out as a yellow oil on cooling. Chemically it is phenolic, having one OH and one  $OCH_3$  group, and therefore gives in alcoholic solution a green colour with  $FeCl_3$ , and a white precipitate with Br water. It gives an intense azure-blue colour when mixed with vanillin and  $H_2SO_4$  and then diluted with a little water (Seeker test). Its alkaline solution gives with Pb, Ba and Mg and other heavy metals insoluble precipitates (Thresh). Fixed alkalis, especially in the heat, destroys its pungency, but baryta water in the heat splits it up into fatty aldehydes and zingerone (pungent). It forms neutral non-pungent oily derivatives when treated in alkaline solution with acetyl, or benzoyl or benzene sulphonyl chloride and similar compounds or with chloroformic esters. It yielded no crystalline oxime or semicarbazone, although it appeared to react with the hydroxyalmine. Slight heat was evolved on mixing with phenylhydrazine, but it formed no crystalline derivative with any type of hydrazine. The sole crystalline derivative was its methyl compound, which was easily purified.

*Methyl gingerol* ( $C_{18}H_{28}O_4$ , m.wt. 308, and  $C_{19}H_{30}O_4$ , m.wt. 322) is not a single substance, but a mixture of the monomethyl ethers of the gingerol constituents. It occurs in needle crystals, m.p.  $64^\circ$  C., which are odourless, non-pungent, and insoluble in alkalis because not phenolic. Optical activity in 2 per cent. chloroform solution  $+ 27.3^\circ$ . Slowly decomposed when heated above  $150^\circ$  C., and rapidly near its boiling point. It is also altered by hot acids or alkalis. On splitting off the added methyl

group by boiling with aluminium chloride in benzene solution, a very pungent oil is obtained, but the gingerol thus regenerated is quite unstable, polymerizing to a red resin insoluble in petroleum ether (Nelson). Even gingerol when prepared *de novo* and purified can be fractionated by means of light petroleum into portions having somewhat different solubilities, which points either to polymerization or to decomposition into simpler products with subsequent recombination to form products more complex than gingerol proper (Lapworth). Methylgingerol forms with hydroxylamine a crystalline oxime hydrate ( $C_{18}H_{29}O_4N.H_2O$  and  $C_{19}H_{31}O_4N.H_2O$ ), which gives Piloty's test for ketoximes, i.e. when dissolved in a little pyridine and ether and treated with bromine water and then with hydrogen peroxide it gives a definite although not very intense yellowish-green colour (bromonitrose compound), which passes into the ethereal layer. Methylgingerol combines readily in the cold with acetyl chloride, thionyl chloride, etc., and also, though very slowly, with phenyl-carbamide. On oxidation with  $CrO_3$  methylgingerol yielded a mixture of fatty acids volatile in steam and veratric acid,  $C_6H_3(OMe)_2.COOH$ , not volatile with steam. Gingerol when similarly oxidized yielded *n*-heptoic acid, and probably *n*-hexoic acid and a small quantity of a volatile oil (heptaldehyde?). Thresh recorded acetic and caproic (hexoic) acids and a neutral oil. The presence of the phenolic hydroxyl in gingerol evidently led to the destruction of the aromatic portion of the molecule by the oxidizing agent, and nothing definite could be isolated from the oxidation product not volatile with steam, but fusion with potash, as noted by Stenhouse and Groves in 1877, yielded a small quantity of protocatechuic acid,  $C_6H_3(OH)_2.COOH$ .

*Zingerone*,  $C_{11}H_{14}O_3$ , is a definite chemical substance, and it also differs from gingerol in possessing a distinct sweet odour reminiscent of salicylaldehyde and to a less extent of vanillin. It resembles gingerol in its extremely pungent taste, which is like that of ginger itself, but quantitative comparisons have not yet been carried out. It occurs in colourless needle crystals or lustrous plates, m.p.  $36-37^\circ C.$  (Lapworth),  $40-41^\circ C.$  (Nomura), soluble in most organic solvents, except petroleum. It is slightly volatile with steam, and only very sparingly soluble in water, but freely in dilute alkali, from which it is precipitated by carbon dioxide. Although when shaken with 2 per cent. soda for several hours it gave no apparent decomposition (No-

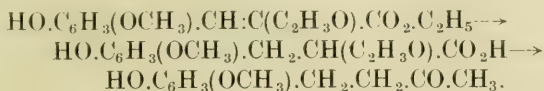
mura), yet prolonged contact for 15 minutes' heating with 5 per cent. soda would destroy the pungency. Its alkaline solutions give neutral non-pungent insoluble derivatives when treated with acetyl or benzoyl or sulphonyl chlorides, or with chloroformic esters—e.g. the ethylcarbonate derivative  $C_{11}H_{13}O_2$   $O.CO_2$  Et, and ethyl chloroformate. These reactions, as also the colour reaction with ferric chloride, show its phenolic character, but it also reacts as a ketone and readily yields a crystalline phenylhydrazone and semicarbazone, but these, as well as other hydrazones and oximes, were very difficult to purify, as they quickly decomposed in solution. It gives a red colour with Millon's reagent, a green with  $FeCl_3$  in EtOH solution, and reduces ammoniacal  $AgNO_3$  on warming, and it should also give a white precipitate with bromine water. It gives a striking colour reaction when warmed with concentrated mineral acids, particularly HBr, passing from faint yellow to brown, then bluish purple to deep purple. On careful addition of alkali the colour becomes blue, finally fading through green to nearly colourless (Lapworth). It should therefore give the "Seeker" test with vanillin and  $H_2SO_4$ . *Methyl Zingerone*,  $C_{11}H_{13}O_2.OMe$ , occurs in colourless non-pungent needle crystals, m.p.  $55-56^\circ C$ . It dissolves readily in most of the usual organic solvents except petroleum, is insoluble in water and in alkalis (absence of phenolic group), but gives the same colour reaction with hydrobromic or hydrochloric acid as zingerone. As a ketone it gives crystalline derivatives with semicarbazide, phenylhydrazines, and hydroxylamine, the last-named derivative giving Piloty's test for ketoximes. Being fully saturated, it does not reduce cold permanganate in acetone solution or decolorize bromine in chloroform solution. When oxidized with  $KMnO_4$  it yields veratric acid  $C_6H_3(OMe)_2.COOH$ , and with  $NaBrO$  it gives  $\beta$ -3 : 4-dimethoxyphenylpropionic acid,  $C_6H_3(OMe)_2.CH_2.CH_2.COOH$ . Zingerone and methyl zingerone in their chemical deportment therefore closely resemble gingerol and methyl- gingerol, but the two latter substances also contain fatty aldehydic groupings which enter into reactions. For example, although methylgingerol contains no phenolic hydroxyl it contains an "aldol" hydroxyl group in the side chain, and therefore can react with acetyl or benzoyl or sulphonyl chloride, and even with phenylcarbamide although in this case action is very slow, whereas methyl zingerone cannot.



**Ginger, New Ketone, Zingerone.** H. Nomura. (*J. Chem. Soc.*, 1917, 111, 769.) On extracting powdered ginger with  $\text{Et}_2\text{O}$ , a crude solution of a ketonic-phenolic substance is obtained; this can be isolated by removal with dilute  $\text{NaOH}$  solution, liberation by  $\text{CO}_2$ , separation of the accompanying acid impurities by treatment with  $\text{Na}_2\text{CO}_3$  solution, and subsequent distillation under reduced pressure. The resulting zingerone,  $\text{C}_{11}\text{H}_{14}\text{O}_3$ , forms colourless crystals, m.p.  $40\text{--}41^\circ\text{C}$ ., and gives a  $\text{NaHSO}_3$  compound, a benzoyl derivative, colourless crystals, m.p.  $126\text{--}127^\circ\text{C}$ ., an acetyl derivative, m.p.  $40\text{--}42^\circ\text{C}$ ., b.p.  $204\text{--}205^\circ\text{C}$ . at 14 mm., a methyl ether,  $\text{C}_{12}\text{H}_{16}\text{O}_3$ , m.p.  $55\text{--}56^\circ\text{C}$ .; b.p.  $186^\circ/16\text{ mm.}$ , and an ethyl ether,  $\text{C}_{12}\text{H}_{18}\text{O}_3$ , m.p.  $66^\circ\text{C}$ .; the methylzingerone forms an oxime crystallizing in colourless needles, m.p.  $93\text{--}93.5^\circ\text{C}$ . From the behaviour of the zingerone in producing these derivatives the presence of one hydroxyl group must be assumed, while its reaction with  $\text{NaHSO}_3$  and its relative resistance to oxidation by ammoniacal  $\text{AgNO}_3$  indicate the presence of a ketonic group. On oxidation with sodium hypochlorite, ethyl-zingerone yields ethylvanillic acid, whilst methyl-zingerone with  $\text{K}_2\text{Mn}_2\text{O}_8$  gives veratric acid; with  $\text{NaBrO}$  the methyl-compound produces bromoform and  $\beta$ -3,4-dimethoxyphenylpropionic acid. These results are in good accordance with the identity of zingerone as 4-hydroxy-3-methoxyphenylethyl methyl ketone,  $\text{CH}_3\text{CO.CH}_2\text{CH}_2\text{C}_6\text{H}_3(\text{OCH}_3)\text{OH}$ , this structure being demonstrated also by a synthesis based on the reduction of 4-hydroxy-3-methoxystyryl methyl ketone, which is obtainable by the condensation of vanillin with acetone. (See also *Y.B.*, 1917, 93.)

**Ginger, Synthetic Preparation of Zingerone, Methylzingerone, and some Related Acids.** A. Lapworth and F. H. Wykes. (*J. Chem. Soc.*, 1917, 111, 790.) Methyl-zingerone, needles, m.p.  $55\text{--}56^\circ\text{C}$ ., was synthesized by the condensation of veratraldehyde and acetone to 3,4-dimethoxystyryl methyl ketone,  $\text{HO.C}_6\text{H}_3(\text{OCH}_3)\text{CH}:\text{CH.CO.CH}_3$ , with subsequent reduction of this product in alcoholic solution by means of sodium amalgam. Zingerone (4-hydroxy-3-methoxyphenylethyl methyl ketone) was obtained in poor yield by the condensation of vanillin with acetone, and reducing the resulting 4-hydroxy-3-methoxystyryl methyl ketone; much better results were obtained by reducing ethyl vanillylideneacetoacetate, and after hydrolysis of the

product, causing the elimination of carbon dioxide by heating, the stages being :



3-4-Dimethoxystyryl methyl ketone on oxidation with aqueous sodium hypobromite gave rise to dimethylcaffeic acid  $\text{C}_6\text{H}_3(\text{OCH}_3)_2.\text{CH}:\text{CH}.\text{CO}_2\text{H}$ ; ethyl vanillylidenecyanoacetate,  $\text{HO.C}_6\text{H}_3(\text{OCH}_3)\text{CH}:\text{C}(\text{CN}).\text{CO}_2\text{C}_2\text{H}_5$ , yellow needles, m.p.  $107^\circ\text{C}$ ., prepared by the interaction of vanillin and ethyl cyanoacetate, on successive reduction, hydrolysis, and elimination of carbon dioxide was converted into hydroferulic acid,  $\text{C}_{10}\text{H}_{14}\text{O}_4$ , needles, m.p.  $89^\circ\text{--}90^\circ\text{C}$ . In a similar manner ethyl  $\alpha$ -cyanocaffeate,  $\text{C}_6\text{H}_3(\text{OH})_2.\text{CH}:\text{C}(\text{CN}).\text{CO}_2\text{C}_2\text{H}_5$ , a yellow microcrystalline solid, m.p.  $162^\circ\text{--}166^\circ\text{C}$ ., was obtained by the condensation of protocatechuic aldehyde with ethyl cyanoacetate, and by successive reduction, hydrolysis, and elimination of carbon dioxide, was made to yield hydrocaffeic acid.

**Gingerol and Paradol.** E. K. Nelson. (*J. Amer. Chem. Soc.*, 1917, **39**, 1466.) Having repeated the work of Thresh and of Garnett and Grier on the pungent principle of ginger, and also of the former on the acid substance of grains of paradise, the author agrees with these workers as to the properties of gingerol and paradol, which are very closely related to each other. He finds, however, that neither are homogeneous substances. Both contain the same constituent, the monomethyl ether of a dihydric phenol,  $\text{C}_{17}\text{H}_{24}\text{O}_2(\text{OH})(\text{OCH}_3)$ , which when methylated furnishes a dimethyl ether, crystallizing from petroleum ether in aggregated needles, m.p.  $65\text{--}65.5^\circ\text{C}$ . Although they have this constituent in common and possess many similar characters, gingerol and paradol are not considered to be identical. On boiling paradol with  $\text{N}/2$  alcoholic  $\text{KOH}$  its pungency is but little affected. Under like conditions, that of gingerol is completely destroyed. Possibly this distinction is due to a difference in the position of the  $\text{OCH}_3$  group. When this investigation was in process the author was unaware of the work of Lapworth.

**Green Leaves, Soluble Carbohydrates in.** H. Kylin. (*Zeitsch. physiol. Chem.*, 1918, **101**, 77, through *J. Chem. Soc.*, 1918, **114**, [1], 245.) The amounts of various soluble carbo-

hydrates have been determined in the leaves of certain plants collected at a period when the products of assimilation are at a maximum. *Tulipa sylvestris* and *Narcissus poeticus* contain 1 per cent. of sucrose in the fresh leaf, together with dextrose and other soluble sugars, but no starch. There is no sucrose or starch in *Gentiana brevidens*, the place of the latter being taken by an apparently new saccharide which reduces Fehling's solution, possesses a laevorotation, and on hydrolysis yields only dextrose. It is present to the extent of 2.5 per cent., calculated on the fresh leaves. *Heimerocallis fulva*, *Fritillaria imperialis*, *Allium victorale*, and *Veratrum nigrum* contain from 2 to 3 per cent. of carbohydrates soluble in water, whilst *Scilla sibirica* and *Iris germanica* contain from 1-2 per cent. There are only traces of starch and reducing sugars in *Convallaria majalis*, but a considerable quantity of a polysaccharide of the inulin type, yielding laevulose on hydrolysis with acetic acid. Of the plants in the leaves of which starch is present, *Hosta Sieboldiana* and *Tilia europaea*, containing moderate amounts of starch, also contain 1-2 per cent. of soluble carbohydrates, whereas in *Taraxacum officinale*, *Bunias orientalis*, and *Acer platanoides*, containing much starch, there are only traces of saccharides soluble in water. With the exception of *Convallaria*, the amount of starch in the leaves is roughly inversely proportional to the amount of soluble carbohydrates present.

**Homoeriodictyol.** O. A. Oesterle and R. Kueny. (*Arch. Pharm.*, 1917, **255**, 308, through *J. Chem. Soc.*, 1917, **112**, [1], 703.) Power and Tutin's homoeriodictyol (*Y.B.*, 1907, 63), named eriodictyonene by Mossler (*ibid.*), has been regarded as a hydrindene derivative by the latter and as 2 : 4 : 6-trihydroxyphenyl 4-hydroxy-3-methoxystyryl ketone by Tutin (*Y.B.*, 1911, 165, 166). Further evidence in support of the latter view has been obtained by the authors. Hesperetin, which is isomeric with homoeriodictyol, has already been converted into 5 : 7 : 3'-trihydroxy-4'-methoxyflavone (luteolin methyl ether, m.p. 253-154°) by the authors. So also homoeriodictyol, for which the authors find m.p. 218° C. (Power and Tutin give 223° C.; Mossler, 214-215° C.) has been converted into a new luteolin monomethyl ether, which is 5 : 7 : 4'-trihydroxy-3'-methoxyflavone,



citron-yellow needles, m.p. 324–325° C. (decomp.), the positions of the substituents being determined by the nature of the fission products (phloroglucinol and ferulic acid) of homoeoriodictyol. The substance is obtained as follows. Tetra-acetylhomoeoriodictyol, m.p. 154° C. (Power and Tutin give the same m.p.; Mossler gives 158° C.), is converted by Br in  $\text{CHCl}_3$  into a crude bromide, a hot EtOH solution of which is treated with 50 per cent. KOH and subsequently with water. The new luteolin monoethyl ether is precipitated from the solution by HCl, and is best purified through its triacetate,  $\text{C}_{16}\text{H}_9\text{O}_6\text{Ac}_3$ , faintly yellow needles, m.p. 215–216° C. The triacetate yields luteolin when boiled for 9 hours with equal volumes of glacial acetic acid and HI sp.g. 1.96. The authors direct attention to the great similarity between 5 : 7 : 4'-trihydroxy-3'-methoxyflavone and Tutin and Clewer's chrysoeriol (*Y.B.*, 1909, 33), and hope to prove that the two substances are identical.

**Hymenodictyon excelsum Bark, Constituents of.** C. S. Gibson and J. L. Simonsen. (*J. Proc. Asiatic Soc. Bengal*, 1916, 12, 161, through *J. Soc. Chem. Ind.*, 1918, 37, 107A.) The extract of this bark when injected subcutaneously into two frogs gave no indication of any physiological action. The glucoside, aesculin, and its product of hydrolysis, scopoletin, were isolated from the bark. (See also *Y.B.*, 1883, 492; 1884, 500; 1886, 430.)

**Insect Flowers and Insect Flower Stems, Occurrence of Mn in.** C. C. McDonnell and R. C. Roark. (*J. Agric. Research*, 1917, 11, 77, through *J. Chem. Soc.*, 1917, 112, [1], 720.) The amounts of Mn present in the stems, "open" flowers, and "closed" flowers of *Chrysanthemum cinerariaefolium* from Japan and from Dalmatia have been determined. The Mn content of both stems and flowers varies considerably and is but little different in the two parts of the plant. The estimation of the Mn content of an insect powder in order to detect adulteration with powdered stems is therefore useless. Pyrethrum of Japanese origin contains more Mn than that from other countries, probably owing to the high Mn content of the volcanic soils of Japan. The Mn, N, and  $\text{P}_2\text{O}_5$  content of pyrethrum vary in the same direction.

**Jeffersonia dubia, the Korean Drug "Ko Woren."** Y. Asahina and S. Mayeda. (*Jap. P.S.*, 1918, [433], 1.) This



drug consists of the rhizome of a Berberidaceous shrub. It must be distinguished from the Chinese drug "Woren," which is composed of several species of *Coptis* such as *C. anemonaefolia* and *C. sinensis*. The prefix "Ko" means wild, therefore Ko Woren signifies "wild *Coptis*." The drug occurs in pieces 10 to 20 cm. in length and about 7 mm. thick. It has numerous short tubercular rootlets attached. Its fracture is uneven, but not splintery. The bark is thin and pale brown, the woody portion yellow, and the pith brownish and often broken. The outline of the transverse section is not sinuous, showing four or five rounded segments. The powdered drug was extracted with water acidified with acetic acid, which removed an amorphous alkaloid. This was precipitated as the phosphotungstate compound, which was decomposed with  $\text{Ba(OH)}_2$ . On passing  $\text{CO}_2$  through the mixture to remove the excess of  $\text{Ba(OH)}_2$  as  $\text{BaCO}_3$ , the base also forms a water-soluble carbonate, which is obtained as an unpleasant smelling amorphous brownish hygroscopic substance by evaporation under reduced pressure. It melts with decomposition, at about  $210^\circ \text{C}$ . It does not afford crystalline salts with acids. No berberine was present in the drug. Illustrations of the macroscopic characters and microstructure are given.

**Lenzites sepiaria, Panus stypticus, and Exidia auricula Judae,**  
**Chemical Examination of.** J. Zellner. (*Monatsh.*, 1917, 38, 319-80, through *J. Chem. Soc.*, 114, (1), 55.) Extraction of *Lenzites sepiari*, Sw., collected from pine trunks, with light petroleum, yielded a yellowish brown, fatty oil containing an ergosterol. On extraction with  $\text{Et}_2\text{O}$ , the ergosterol was obtained together with a yellowish red resin soluble in aqueous KOH and NaOH. The EtOH extract was separated into constituents soluble in water, these including mannitol and mycose (trehalose) with small quantities of choline and dextrose; and a fraction insoluble in water, containing brown N-free amorphous substances. The aqueous extract of the fungus contained a carbohydrate which did not reduce Fehling solution, together with a trace of quinoline and mineral substances. Hydrolysis of the leathery residue insoluble in the above solvents gave rise to dextrose as the main product, together with mannose and glucosamine; indications of pentosans were also observed. *Panus stypticus*, Bull., gave similar results, except that two carbohydrates were observed in the aqueous extract.

which agreed in properties with Boudier's viscosin and mycetide (these substances have never yet been obtained in a state of purity) and that glucosamine was the only definite substance isolated from the residual insoluble tissue. With *Exidia auricula Judae*, Fr., similar observations were made, but no mannose or mycetide was detected in the EtOH and aqueous extracts, respectively; the viscous constituent in the aqueous extract on hydrolysis yielded mannose with a little dextrose and on oxidation with  $\text{HNO}_3$  produced only oxalic acid; it is, therefore, probable that the mucous substance is a mannane.

**Linaria, Readily Crystallizable Organic Substance in.** H. Molisch. (*Ber. Deut. bot. Ges.*, 1917, **35**, 99, through *J. Chem. Soc.*, 1917, **112**, (1), 506.) The epidermis of *Linaria genistifolia*, *L. bipartita* and *L. reticulata* contains an almost saturated solution of an organic substance which, shortly after the epidermis is placed in a drop of water on a microscope slide, crystallizes out in single or twinned spherites, double brush forms, or prisms of a pale yellow colour. Treatment of the epidermis with EtOH, glycerol, acetone,  $\text{Et}_2\text{O}$ ,  $\text{CHCl}_3$ , sugar solution, xylene, 10 per cent. HCl,  $\text{HNO}_3$ , or  $\text{H}_2\text{SO}_4$  acid, 5 per cent.  $\text{H}_2\text{C}_2\text{O}_4$  solution, or concentrated  $\text{HC}_2\text{H}_3\text{O}_2$  causes immediate precipitation of the substance.  $\text{Na}_2\text{CO}_3$  solution, or 10 per cent.  $\text{K}_2\text{CO}_3$  solution, colours the crystals an intense yellow, but does not dissolve them, whilst KOH, NaOH, or  $\text{Ba}(\text{OH})_2$  or AmOH dissolves them, giving yellow solutions. The substance occurs in the epidermis of all parts of the plants with the exception of the root.

**Litchi sinensis Nuts, Constitution of.** B. E. Read. (*J. Amer. Chem. Soc.*, 1918, **40**, 87.) The so-called Chinese hazel nut are the seeds of the sapindaceous *Litchi sinensis* (*Nephelium litchi*, Sonn). The leaves and branches of many of this and allied species are poisonous, the fruits of others are edible. The litchi has now become established in the American market, being imported from Canton. As generally eaten they are sundried. It is stated that when taken in excessive quantity they occasion high temperature and epistaxis. The seeds are reputed to be anodyne. The fleshy arillus is given for glandular enlargements and tumours. The flowers and bark are used for angina and quinsy. The author has failed to find any active principle indicating that the fruit has any value as a drug. It was fed to a rabbit for a long period in quantity without producing any

toxic effect whatever. It has undoubted nutritive value, containing large amounts of simple sugars, but no fat. Citric acid was also present. It is regarded as being a wholesome and palatable addition to the diet, but of no medicinal value.

**Loganberries and their Juice, Composition of.** M. R. Daugh-  
ters. (*J. Ind. Eng. Chem.*, 1918, 10, 30.) The whole ripe  
berry was found to have the following percentage composition :  
Total solids, 20.74 ; moisture, 79.26 ; citric acid (anhydrous),  
1.52 ; invert sugar, 7.15 ; sucrose, absent ; proteins ( $N \times 6.25$ ),  
4.55 ; fat ( $Et_2O$  extract), 0.613 ; crude fibre, 1.38 ; ash, 0.571

The juice, expressed at different dates, had the following char-  
acters :

Sample No.	I	II	III	IV
Date of Collection (1917)	July 18	July 25	July 28	August 7
Specific Gravity (25° C.).	1.0526	1.0548	1.0565	1.0599
Acidity (as anhydrous citric)	1.904	1.60	1.515	1.54
Citric Acid (anhydrous)	1.82	1.521	1.511	1.54
Volatile Acids (acetic)	—	0.048	0.025	—
Total Solids	—	12.84	12.49	14.74
Invert Sugar	8.55	8.80	9.06	8.74
Protein ( $N \times 6.25$ )	—	0.871	0.497	0.37
Ash	—	0.499	0.45	0.39

Citric acid is the chief acid of the loganberry. Traces of  
tartaric and volatile acids are also present. Malic acid is absent.

**Manganese Content of Certain Drugs.** L. E. Westman,  
and R. M. Rowat. (*J. Amer. Chem. Soc.*, 1918, 40, 558.)  
The percentage of Mn present in certain drugs has been deter-  
mined. Further, the amount of Mn extracted by boiling certain  
drugs in water has been estimated. It is suggested that a  
"Manganese number" for certain pharmaceutical extracts  
might prove useful in determining their value.

Drug examined.	Per cent. manganese present.
<i>Rhamnus Frangula</i>	0.0242 to 0.0674 $\pm 0.0003$
<i>Cinnamomum Cassia Cortex</i>	0.0624 $\pm 0.0003$
<i>Rhamnus Purshiana</i>	0.0137 to 0.0223 $\pm 0.0003$
<i>Podophyllum (root)</i>	0.0052 $\pm 0.0002$
<i>Senna</i>	0.0043 $\pm 0.0002$
<i>Rhubarb</i>	0.0036 $\pm 0.0002$
<i>Rhamnus Californica</i> (mature bark)	0.0033 $\pm 0.0002$
<i>Liquorice root</i>	0.0026 $\pm 0.0001$
<i>Jalap (root)</i>	0.0024 $\pm 0.0001$
<i>Euonymus atropurpureus</i>	0.0021 $\pm 0.0001$
<i>Cassia pulp</i>	0.0017 $\pm 0.0001$
<i>Barbados Aloes</i>	0.0006 $\pm 0.00005$

From data available it would appear that both *Rhamnus*  
*Frangula* and cassia bark show a higher content of Mn than any

other similar plant tissue previously examined. It was found that all samples of these barks did not show the same Mn content, and observed limits of the amounts present are given above. The lower numbers represent mature or thick bark while the higher numbers were obtained from thinner bark. It is quite possible that an examination of specially selected bark would widen this range. Factors involving the change of Mn content with the season have not been studied. In an attempt to locate the cells or region of the bark giving the highest content of Mn, both inside and outside scrapings were examined. It was found for *Rhamnus Purshiana* that the concentration of Mn in the inner third of the bark was about double that present in the outer third. This may indeed be generally true and would go to show that although Mn is present in the outer layers of the bark it really functions more particularly in the inner layers where plant metabolism is more actively going on. The accidental presence of definite amounts of Mn in these barks cannot be accepted as an explanation, while the conception that a definite concentration of Mn is a factor in the normal metabolism of any particular species, seems more probable. It is natural to expect that a plant using a higher concentration of Mn in certain working cells might leave behind in the older bark a higher uniform residue. In any case it seems evident that the amounts of Mn found are definite.

The water soluble Mn was determined by extracting the material by percolation and by boiling. It was found that about one-quarter of the total Mn present may be thus extracted from the barks of members of the N.O. *Rhamnaceae* as follows:

Bark.	Total Mn.	Mn extracted by water.
<i>Rhamnus Frangula</i> . .	0.0242 per cent.	0.0058 per cent.
„ <i>Purshiana</i> . .	0.0137 „	0.0029 „
„ <i>Californica</i> . .	0.0035 „	0.0008 „

The material was extracted by the U.S.P. X. method Type D, p. 176 (preliminary infusion 1 : 5 in boiling water, then exhaustion by percolation with boiling water). The Mn thus extracted does not appear to be in inorganic combination, and is not removed from these extracts by ordinary means. It is suggested that the “Manganese number” may serve to distinguish between these closely allied barks. A development of the “Manganese number” for their extracts may become an important factor in their examination.

A simple application of the  $\text{NH}_4\text{SO}_4$  method for the determina-



tion of small amounts of Mn was employed. The work was done in two ways, depending on the Mn found present by initial trials. Wherever 10 Gm. samples are available, the following procedure may be recommended: If the presence of Mn is known to be of the order of 0.015 per cent. or higher, it is possible to titrate directly the permanganate formed with  $N/Na_2HAsO_3$  solution. If the percentage is lower than this it is more feasible to compare the colour developed with solutions of known permanganate content which have been carefully prepared and correspond with the unknown solution with regard to acidity and general ion concentration. In cases of the first order of Mn content, 10 Gm. samples of the well-ground materials were ashed in Pt in a muffle and 20 c.c. of pure  $H_2SO_4$  was added. The sample was then heated till the acid fumed freely in order to remove Cl. It was then cooled and diluted with distilled water, washed out into a 500 c.c. beaker and diluted to at least 300 c.c. To this solution was added 1 c.c. of a  $AgNO_3$  solution (5 : 100) and the whole warmed to about  $80^\circ C$ . Approximately 1 Gm. of  $NH_4SO_4$  was gradually stirred into this solution which was then heated on the steam bath as long as the colour of the permanganate deepened. The reaction was found generally to be complete at the end of 30 minutes. The solution was, however, heated 45 minutes and allowed to cool. When cold it was rapidly titrated with  $N/10 Na_2HAsO_3$  which had been standardized against known amounts of  $NaMnO_4$  developed in the same way. Unless the dilution is sufficient, a brown hydrated form of Mn will separate out after the addition of the  $NH_4SO_4$ . Where the percentage of Mn is as high as 0.06 a volume of 500 c.c. is necessary when working on a 10 Gm. sample. In cases where the Mn was lower than 0.01 per cent. the colour was developed as above from a 10 Gm. sample in a 200 c.c. volumetric flask and compared by means of a colorimeter with standard solutions of  $NaMnO_4$ . (See also *Y.B.*, 1908, 110; 1912, 49, 128, 156, 171; 1013, 176; 1914, 116; and *Gen. Index*.)

***Ocotea usambarensis*, Occurrence of  $\psi$ -Cubebin in.** J. Halberkann. (*Arch. Pharm.*, 1916, 254, 246, through *J. Chem. Soc.*, 1917, 112, (1), 507.) The author has isolated from the bark of the Ibean camphor tree, *Ocotea usambarensis*, a substance,  $C_{20}H_{20}O_6$ , needles, m.p.  $121.5-122^\circ$ ,  $(\alpha)_D^{22} + 60-61^\circ$  in  $CHCl_3$ , which appears to be identical with Peinemann's  $\psi$ -cubebin.

**Pangium edule and Hydnocarpus Alcalae Seeds, Investigation of.** H. C. Brill. (*Philippine J. Sci.*, 1917, **12**, 37.) The seeds of *Pangium edule* contain gynocardin, and the leaves of the plant contain gynocardase, which hydrolyzes the glucoside, so also does emulsin. Gynocardin is probably a  $\beta$ -glucoside. The oil from the mature seeds was fluid at normal temperatures showing only slight clouding at  $2^{\circ}\text{C}$ . Sp.g., 0.9049;  $a_D + 4.28^{\circ}$ ; Hanus value, 113.1; acid value, 0.52; saponification value, 190.2;  $n_D$ , 1.4665. The figures for the oil of the immature seeds and for the fatty acids are also given. The oil was nontoxic; 2.5 Gm. administered to a guineapig gave no result. It contains only a small amount of optical active fatty acids which may be either hydnocarpic or chaulmoogric acid or a mixture of both. The bulk of the oil consists of olein and palmitin. If the hydnocarpic and chaulmoogric esters are specific for leprosy, *Pangium* oil might be employed since its fluid state makes it easy to administer. But its action would probably be slow since the amount of these acids it contains is but small.

*Hydnocarpus Alcalae* seeds yield a fat with a very high m.p.,  $32^{\circ}\text{C}$ .; sp.g., 0.950 at  $30^{\circ}\text{C}$ .;  $a_D + 49.6$  in  $\text{CHCl}_3$ ; Hanus value, 93.1; acid value, 3.9; saponification value, 188.9;  $n_D$ , 1.4770; Reichert-Meissl value, 4.43. More than 90 per cent. of the fatty acids of the oil were identical with Power's chaulmoogric acid. No hydnocarpic acid was detected; if present, it would be in small amount only. The rest of the fatty acids is mainly palmitic acid. The solid consistence of this fat would render it difficult to administer medicinally.

**Plant Tissues, Detection of Ca in by means of KOH or a Mixture of KOH and  $\text{K}_2\text{CO}_3$ .** Hans Molisch. (*Ber. deut. bot. Ges.*, 1916, **34**, 357-63, *J. Chem. Soc.*, **112**, (11), 387.) In plant sections containing dissolved or undissolved Ca salts, treatment with a drop of semi-saturated aqueous KOH leads to the gradual formation of characteristic, hexagonal plates or discs. The crystals consist of the double salt,  $2\text{CaCO}_3 \cdot 3\text{K}_2\text{CO}_3 \cdot 6\text{H}_2\text{O}$ . This test is rendered more rapid and certain if the semi-saturated KOH solution is mixed with saturated  $\text{K}_2\text{CO}_3$  solution (1 : 1).

**Plectranthus inflexus, Crystalline Principle from.** S. Ueno. (*Jap. Pharm. J.*, 1917, (430), 1085.) The air-dried leaves and fruit of *Plectranthus inflexus* were extracted with cold EtOH. On distilling off the solvent the residue formed a dark green crystalline mass. This was treated with  $\text{Et}_2\text{O}$ . The granular

crystalline pale brown substance left, insoluble in  $\text{Et}_2\text{O}$ , was digested with  $\text{EtOH}$  and animal charcoal and recrystallized. In this manner white silky bitter needles, m.p.  $280-285^\circ\text{C}$ ., insoluble in water, were obtained. The substance contains no  $\text{N}$ : it is not a glucoside; the  $\text{EtOH}$  solution is not affected by  $\text{FeCl}_3$  nor by  $\text{Pb } 2\text{C}_2\text{H}_3\text{O}_2$ . Further investigation is in progress.

**Quisqualis indica L. var villosa, The Fruit of.** Y. Deh-vong. (*J. Pharm. Soc. Japan*, 1917, (420), 135, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2389.) The kernels of the seeds, rich in oil, are used in China as a vermifuge. Extraction with various solvents gave in the case of  $\text{Et}_2\text{O}$  24.71 per cent.,  $\text{EtOH}$  12.57 per cent., water 25.71 per cent. The  $\text{Et}_2\text{O}$  extraction (crude oil) forms a thick yellow liquid having the following constants: Sp.g., 0.9072 at  $20^\circ\text{C}$ .; solidification p.,  $-2^\circ$ ; acid value, 31; saponification value, 255.92; I value, 39. The oil contained palmitic acid and oleic acid, and among the unsaponifiable products a crystalline compound, m.p.  $116^\circ\text{C}$ . The  $\text{EtOH}$  extract consisted mainly of sucrose.

**Rhubarb Leaves and Stems, The Oxalic Acid Content of.** L. van Itallie and H. J. Lemkes. (*Pharm. Weekblad*, 1917, 54, 1234-8.) Increased use of rhubarb to relieve the food shortage has been urged in Germany and Holland. But caution is needed, in view of fatal cases of poisoning which have been traced to greens made from rhubarb leaves. The authors have found the content of anhydrous  $\text{H}_2\text{C}_2\text{O}_4$  to vary from 0.30 to 1.11 per cent. in the fresh leaves, and from 0.44 to 0.99 per cent. in the stems. The toxic dose of  $\text{K}_2\text{C}_2\text{O}_4$  is variously stated from 2 to 5 Gm., but in reality it is much lower.

**Rumex pulcher, Chemical Constituents of.** E. J. Emanuel. (*Schweiz. Apoth. Zeit.*, 1917, 55, 589, 601, 618, 626.) The root of *Rumex pulcher* contains pulcheremodin  $\text{C}_{15}\text{H}_{10}\text{O}_5$ , chrysophanic acid,  $\text{C}_{15}\text{H}_{10}\text{O}_4$ , and pulcherinic acid,  $\text{C}_{19}\text{H}_{18}\text{O}_4$ , in the form of anthraglucosides, which were not isolated in a crystalline state. Pulcheremodin forms fine needle-shaped crystals, m.p.  $251^\circ\text{C}$ . Pulcherinic acid occurs in small, prismatic, yellowish white crystals, m.p.  $168-169^\circ\text{C}$ . For details concerning the isolation of these constituents the original communication should be consulted. In addition to these compounds the root contains 0.285 per cent. of  $\text{Fe}$  probably combined with an organic acid.

**Serrulata tinctoria, Serratulin** in. H. Molisch. (*Ber. Deut. bot. Ges.*, 1916, **34**, 554, through *J. Chem. Soc.*, 1917, 112, (1), 507.) The statement occurring in the literature that *Serratula tinctoria* contains *in vivo* a yellow colouring matter is erroneous. The cells of the living plant contain a colourless or almost colourless substance, serratulan, which undergoes post-mortem transformation, under the influence of various materials, into an intensely yellow substance, serratulin. Serratulan occurs in the root and stem, and in particular abundance in the leaves.

**Strychnos Nux blanda Seeds from Burma.** A. W. Hill and J. Small. (*Kew Bulletin*, 1917, (4, 5), through *Chem. and Drugg.*, 8917, **89**, 963.) In 1913 some nux-vomica seeds were imported to London from Burma which contained neither strychnine nor brucine. The plant that yields them is now found to be a new species. It appears that *Strychnos Nux-vomica* does not occur in Burma, but that the new species, which has been appropriately named *Strychnos Nux-blanda*, has hitherto been mistaken by local botanists for *Strychnos Nux-vomica*, so that the seeds were evidently sent over by the exporter in error. Indeed, the seeds so closely resemble those of nux-vomica in structure that no character could be found to distinguish the two if powdered. To the critical eye the seeds of *S. Nux-blanda* have a whiter hue and a rougher hairy surface, the hairs being set at a more obtuse angle to the surface of the seed. It is important to note that this new species, known in Burma as "Khabaung," extends westwards to Manipur and eastwards to Siam, with a variety in Cochin China and Cambodia, so that there is the possibility at any time of the false seeds being mixed with the genuine if coming from districts within these limits. It is suggested that the seeds of other species of *Strychnos* in our Colonies and Dependencies may be worth examination as to their percentage of strychnine, such as those of *S. lucida* and *S. cinnamifolia* which contain a fair percentage of alkaloid. *S. Ticuté*, *S. ovalifolia*, and *S. quadrangularis* are distinctly poisonous species, but their seeds and barks do not seem to have been exploited as sources of strychnine. With regard to nux-vomica seeds, it was shown many years ago by Dunstan and Short that different commercial samples varied considerably in their alkaloidal yield, and the authors now point out that there are several allied species, such as the Hong-Kong species (*S*



*angustiflora*, Benth.), *S. donnaiensis*, from Cochin China, and *S. usitata*, with seeds similar to those of *S. nux-vomica*, whilst *S. ligustrina* and *S. lucida*, in Timor and North Australia, may be worth investigation from the point of view of percentage of strychnine for manufacturing purposes.

**Tannin, Micro-detection of, in Plant Tissues by means of Iodine.** A. S p e r l i c h. (*Ber. deut. botan. Ges.*, 1917, **35**, 69, through *J. Chem. Soc.*, 1917, **112**, (2), 400.) I in traces penetrates into cells without injury to the living plasma, the tannins dissolved in the cell-sap gradually forming resistant, characteristic substances of different shades of brown. The substances formed are probably oxidation products allied to or identical with phlobaphenes. Other substances, such as oils, resins, etc., also fix I, which is removable more or less easily and rapidly by EtOH. The compounds formed in the above way by tannins are highly stable, and the sections may be subjected to further staining operations.

**Trichilia emetica, Seed Oil and Bark of.** J. S. J a m i e s o n. (*S. African J. Sci.*, 1917, **13**, 496-8, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 772.) The fruit, which weighs about 20 Gm., contains four seeds which yield 32 per cent. of a brownish fat to petroleum ether. The fat, m.p. 30° C., has the sp.g., 0.9114; I value, 67.3; saponification value, 201; acid value, 0.008; Reichert-Meissl value, 3.1; Polenske value, 3.3; butyrometer reading, 30°, 59.5; unsaponifiable matter (phytosterol), 2 per cent. The fat had no toxic effect on a guinea pig. It consists mainly of stearin and olein with 2-3 per cent. capronin. The fatty acids melted at 35-37° C. The bark of *T. emetica*, known to the Natal kaffir as Umkhulu, is used as a purgative. It yields 12 per cent. extractive matter to EtOH, which consists of a refractory resin with some protocathechuic acid and a small quantity of glucose; alkaloids and glucosides are absent. The bark yielded 22.32 per cent. total solids to water, 6.83 of which were tannins.

**Uzara Root, Chemical Constituents of.** W. H e n n i g. (*Arch. Pharm.*, 1917, **255**, 382, through *J. Soc. Chem. Ind.*, 1918, **37**, 39A.) Uzara root is stated to be of medicinal value on account of its anti-diarrhœic properties. The drug is procurable under the name "uzaron," which is the dried alcoholic extract of the root. From uzaron the author has isolated two glucosides

having different physiological effects, one of which is amorphous and is present in very small amount, whilst the other, *uzarin*,  $C_{75}H_{108}O_{30} \cdot 9H_2O$ , forms colourless needles, m.p. about  $210^{\circ}C$ ., decomposing at about  $200^{\circ}C$ . On hydrolysis uzarin yields propyl alcohol, dextrose, and uzaridin,  $C_{18}H_{24}O_5 \cdot \frac{1}{2}H_2O$ , colourless leaflets, decomposing at about  $246^{\circ}C$ . (anhydrous), the last substance being partly changed to anhydrouzaridin,  $C_{18}H_{22}O_4 \cdot \frac{1}{2}H_2O$ , colourless needles, decomposing at about  $208^{\circ}$ – $214^{\circ}C$ . (anhydrous). Uzaridin forms a triacetyl derivative, needles, m.p.  $225$ – $227^{\circ}C$ .

**Valuation of Valerian Rhizome.** T. Rydén. (*Svensk Farm. Tidskrift*, 1917, 21, 525–9.) The valeric and other acids were not determined in the tincture, as usual, but on the filtrate from the powder of the drug after saponification with 100 c.c. N/5 KOH in EtOH. An aliquot acidified with  $H_3PO_4$  and brought to a volume of 120 c.c. with  $CO_2$ -free water was distilled so as to give a distillate of 110 c.c. in one hour. This distillate was then titrated with  $Ba(OH)_2$ . One c.c. of N/10  $Ba(OH)_2$  is equivalent to 0.0102 Gm. of valeric acid. Some of the volatile acids are withheld in the residue. Another identical aliquot is added to this flask containing the residue and treated in the same manner and another 110 c.c. distilled. The two distillates contain all of the volatile acids in the two aliquots used. The usual method of extracting the drug does not remove all the volatile acid and esters. A requirement of 4 per cent. volatile acid is recommended. The ash of the drug should not exceed 10 per cent.

**Xanthoxylum, Further Notes on Chemical Constituents of the Genus.** H. Bocquillon. (*Répertoire*, 1917, 28, 226.) In addition to the definite chemical constituents formerly (*Y.B.*, 1917, 162) reported on as occurring in the genus *Xanthoxylum*, the following are now mentioned: a glucoside resembling saponin from *X. pentanome* and a glucoside *xanthoxylin* ( $C_{30}H_{38}O_9$ ) found by Eberhard in *X. cariolanum*. Three alkaloids: berberine ( $C_{20}H_{17}NO_4$ ), artarine ( $C_{24}H_{23}NO_4$ ), and *xantherine* ( $C_{24}H_{25}NO_6$ ) are said to have been isolated from various species of *Xanthoxylum*. Several hydrocarbons of the terpene group have been found, also substances of alcoholic and of aldehydic functions. A stearoptene, *xanthoxylene*, is also recorded.

# MATERIA MEDICA

## NEW REMEDIES

(To June 30, 1918)

COMPILED BY THOS. STEPHENSON, F.R.S., Edin.

*(In the case of items marked\* the information is derived from makers' publications.)*

**Allylene.\*** A preparation of *Allium sativum* used in tuberculosis.

**Anusan.\*** A name given to suppositories containing Peruvian balsam, resorcinol, iodol, and suprarenal gland, also to an ointment containing phenol, zinc oxide, cocaine, and lanolin. Both are used for haemorrhoids, pruritus ani, etc.

**Arsaminol.** The name given to salvarsan made in Japan.

**Arsphenamine.** The name adopted for home-made salvarsan by the Federal Trade Commission, U.S.A., as a convenient abbreviated form of arsphenolamine hydrochloride, the latter being the name adopted by the American Medical Association.

**Barbital.** The name adopted by the Federal Trade Commission, U.S.A., for veronal or barbitone.

**Borsal.** A mixture of equal parts of boric and salicylic acids, used as an antiseptic for wounds.

**Calcreose.** Described as a mixture containing in loose chemical combination approximately equal weights of creosote and lime. Its therapeutic effect is that of creosote, while it does not produce gastric irritation. It is a dark brown powder, partially soluble in water. Dose, 0.25 to 1 Gm. (4 to 16 grains) every 2 to 4 hours (*J.A.M.A.*, 1917, 69, 821.)

**Camiophen.\*** An ointment said to be prepared by mixing "iocamfen" (a liquid obtained by the interaction of iodine 10, phenol 20, and camphor 70) with an equal weight of a mixture composed of lard, wax, and oil of theobroma. The iodine is contained in combined form. It is used in skin diseases.

**Cargentos.\*** A form of colloidal silver oxide, issued in the form of crystals, tablets, and ointment. It is recommended as a non-irritating antiseptic.

**Chloramine-B.** Sodium benzene sulphochloramine,  $C_6H_5SO_2-NaCl + 2H_2O$ . It is a white crystalline powder, having a slight chlorous odour, and is similar in antiseptic properties and uses to Chloramine-T, the corresponding toluene compound (*J.A.M.A.*).

**Chlorcosane.** So far the only suitable solvent for dichloramine-T has been chlorinated eucalyptol (see *Y.B.*, 1917, 167). The antiseptic was dissolved in this, and the solution subsequently diluted with liquid paraffin. The use of eucalyptol has, however, two disadvantages: its application is sometimes followed by a rash, and it is expensive and by no means plentiful at the present time. Dakin and Dunham (*B.M.J.*, 1918, 1, 51) have been conducting experiments with a view to finding a solvent which would be bland and inexpensive, and at the same time form a stable solution. After many trials they have found that chlorinated paraffin wax answers this description. Ordinary hard paraffin, melting at  $50^\circ C.$  or higher, is melted in ordinary glass flasks and heated to  $120^\circ C.$ ; a current of chlorine gas is passed through this, under suitable conditions as to regulation of temperature, etc., until the contents of the flasks have increased in weight 45 to 55 per cent. The resulting product, which is of oily consistence, is shaken with dry sodium carbonate and then filtered through paper. The result is a clear oil of a yellow colour, slightly heavier than water, almost odourless, and perfectly bland. This substance, which the authors propose to call *Chlorcosane*, can dissolve from 8.5 to 10 per cent. of dichloramine-T at room temperature. For wound treatment a 7.5 to 8 per cent. solution is strong enough; this is prepared by heating a portion of the chlorcosane to  $75^\circ$  or  $80^\circ C.$ , adding the necessary amount of dichloramine-T, and at once diluting to the required bulk. This solution is practically stable if preserved in amber bottles and not exposed to unnecessary



heat or to moisture. For use as a nasal spray the addition of 10 per cent. of carbon tetrachloride reduces the viscosity of the solution. For other purposes the undiluted thicker oil is preferable.

**Citresia.** Magnesium acid citrate,  $\text{MgHC}_6\text{H}_5\text{O}_7 \cdot 5\text{H}_2\text{O}$ . A white powder with an acid taste, given in doses of 25 Gm. (6 dr.) as a laxative, and 50 Gm. ( $1\frac{1}{2}$  ounce) as a purgative, dissolved in water (*J.A.M.A.*).

**Dormigene.\*** Brom-isovaleryl-urea ("bromural") manufactured in Great Britain.

**Enesol.** Mercury salicylarsenate, used as an instillation, 1 : 1000 or 1 : 500, in infections of the cornea (*Paris Méd.*).

**Gastron.** A solution of the gastric tissue juice obtained from the pig. A viscid, slightly opaque, straw-coloured fluid. Given in gastric disorders : dose, 4 to 8 ml. (60 to 120 minims) (*J.A.M.A.*).

**Halazone** (see *Y.B.*, 1917, 169). A water disinfectant. Dunham and Dakin (*B.M.J.*, 1917, 2, 790) have investigated the keeping qualities of this substance. "Halazone" tablets consist of *p* sulphon dichloramino-benzoic acid with sodium chloride and borax or sodium bicarbonate, and these tablets, they find, if prepared from thoroughly dry materials, are practically stable at room temperature, while at higher temperatures there is slight decomposition, which depends on the temperature. Prolonged exposure to  $40^\circ$  to  $50^\circ$  C. ( $104^\circ$  to  $122^\circ$  F.) reduces their efficiency by about one-half in 3 months.

**Hedroin.\*** A trade name adopted for products known under the name of "heroin" (diamorphine).

**Hychlorite.** An American solution prepared by decomposing chlorinated lime suspended in water with sodium carbonate, and adding a solution of electrolyzed sodium chloride. It contains sodium hypochlorite, 4.05 per cent.; sodium chloride 3.2 per cent.; calcium hydroxide, 0.25 per cent.; the available chlorine is 3.85 per cent. It is used as an antiseptic (*J.A.M.A.*).

**Hydriion.** A wound antiseptic prepared from the following formula :—Mercury perchloride, 4.375 grains; calcium chloride, 1.86 grains; sodium chloride 34.76 grains; potassium chloride,

0.076 grains. Make into 40-grain tablets. One tablet is dissolved in a pint of water to make an antiseptic solution.

**Ixora.** An Indian drug (*Ixora coccinea*) used as a stomachic tonic and in dysentery. It is referred to in the report of the Indigenous Drugs Committee. A tincture is prepared.

**Mercury Ortho-amido-benzoate** (*Prescriber*, 1918, 12, 72). A new salt of mercury introduced by Louis Bory. It is prepared by the double decomposition of mercuric acetate and sodium ortho-amido-benzoate, and is obtained as a salmon-yellow precipitate. The salt is soluble in sodium chloride solution. Bory regards it as the "mercurial analogue" to salvarsan, and gives it in doses of 0.04 to 0.06 Gm. ( $\frac{2}{3}$  to 1 grain).

**Neodiarsenol.** A neosalvarsan substitute prepared in Canada. It is known also as *Arsenphenolamine-S*.

**Opolaxyl.\*** A laxative preparation described as "the combined secretion of the liver, pancreas, and intestines, with a vegetable extract."

**Pro-Caine.** The name given to novocaine, as manufactured in America, by the Federal Trades Commission.

**Rectoline.\*** An ointment containing aesculin, adrenaline, and cocaine, for use in haemorrhoids.

**Rectosol.\*** The name given to suppositories containing rectoline and a bismuth salt.

**Sedaerine.\*** A liquid, said to be prepared from several herbs, including horse chestnut and *Sedum acre*, for use in haemorrhoids.

**Sodium Morrhuate.** The success of intravenous injections of sodium gynocardate in leprosy (see *Y.B.*, 1917, 190) has led Rogers to experiment with a sodium salt of the fatty acids of cod-liver oil as a remedy for tuberculosis. This salt, which he terms "sodium morrhuate," is readily soluble in a 3 per cent. solution, and practically painless on subcutaneous injection. He reports (*Indian Med. Gazette*, 1918, 53, 73) that in a phthisical case a dose of 1 c.c. of this solution produced a slight temperature reaction, but half that amount was followed by a fall of temperature and improvement in other respects. He thinks that this preparation is clearly worthy of trial in tubercular

diseases by the hypodermic method. Great caution will be necessary in giving such injections intravenously, lest dissemination of the disease be produced : a point he hopes to test experimentally.

**Splenox.** A "specific" for malaria recommended by Willis (*Ind. Med. Gaz.*, 1917, **52**, 230). It contains "the juice of a species of lemon, crude borax, and the sulphate, phosphate, and chloride of calcium," but the exact formula is not given. Rogers (*Ibid.*, 1917, **52**, 385) condemns it as valueless.

**Stannoxyd.** A mixture of pure tin and tin oxide introduced by Grégoire and Frouin as a remedy for boils and other staphylococcus infections. It is reported on by A. Compton (*Lancet*, 1918, **1**, 99), who has tried it in a number of cases, mostly military, with most-encouraging results. The dose is 0.5 to 1.0 Gm., given as compressed tablets. Stannoxyd has also been tried with some success against the secondary infection of pulmonary tuberculosis.

**Syphilodol** ("707").\* A salvarsan substitute, said to contain silver, arsenic, and antimony.

**Thiarsol.** A solution of colloidal arsenic trisulphide, 1 : 2000.

**Unoline.** A liquid prepared from the mineral residue obtained by incineration of willow charcoal, and containing potassium and other nitrates. It is recommended in rheumatism and neuritis, also in arteriosclerosis (*Lancet*, 1917, **2**, 53).

**Varilaxine.\*** A compound vegetable extract recommended in constipation.

**"X.Y.Z." Paste.** Under this name the following paste is recommended by Morison (*B.M.J.*, 1918, **1**, 343) as an alternative to "bipp" in the treatment of certain classes of wounds :—Xeroform (bismuth tribromphenol. Ammoniated mercury, equal parts. Liquid paraffin, sufficient to make a paste.

## NEW APPLICATIONS OF REMEDIES

BY THOS. STEPHENSON, F.R.S., Edin.

**Acetozone as a Surgical Antiseptic.** Under the name of *Acetozone*, a mixture of benzoyl-acetyl-peroxide,  $C_6H_5CO \cdot O \cdot O \cdot COCH_3$ , and an inert absorbent powder has been on the market for a

number of years. It has been used internally as an intestinal antiseptic, its action being due mainly to liberation of oxygen.

Gore-Gillon (*B.M.J.*, 1917, 2, 209) recommends its use as a surgical antiseptic. It has great potency against micro-organisms in presence of serum; it has no deleterious effect on phagocytosis, and is non-toxic and innocuous to the tissues. It has a stimulating effect on connective tissue cells, promoting healthy granulations. The author introduced acetozone into a military hospital in 1915, and has used it extensively in the treatment of septic wounds. Its action is very rapid: unhealed amputation stumps heal quickly if bathed daily for half an hour with a solution containing 5 to 7 grains in a pint of cold or tepid water. A solution of 10 grains to the pint may be used to soak gauze for dressings, or for application by the Carrel-Dakin method. In very septic cases a solution of 20 grains to the pint may be used. This strength is also useful for sterilization of the skin. The solution is colourless and does not stain. It should be made fresh every 7 days, and should be shaken before using to diffuse the insoluble inert powder.

**Arsenobenzol for Trench Throat (Vincent's Angina).** (*Practitioner*, 1917, 99, 594.) W. H. M'Kinstry swabs the gums once or twice daily with an alkaline salvarsan solution, double the strength used for intravenous injections. Before the solution is applied, the gums should be carefully dried with cotton wool, and extraneous matter picked out from between the teeth with a dentist's probe. This treatment is continued once or twice daily until smears from the gums show no fusiform bacilli and the gums show no bleeding points.

**"Bipp," an Improved Formula.** The formula for bismuth-iodoform-paraffin paste, or "Bipp," has been slightly modified. R. Morison (*B.M.J.*, 1917, 2, 503) gives the following formula, in which liquid paraffin is superseded by soft paraffin:— Iodoform, 440 gm.; bismuth subnitrate, 220 gm.; soft paraffin, 220 gm.

All the ingredients must be carefully sterilized; the paraffin must be odourless, tasteless, melting point  $45^{\circ}\text{C}$ ., and free from acidity and organic impurities. Both iodoform and bismuth must be the purest obtainable. To make a product of softer consistence, a special base composed of paraffin (m.p.  $45^{\circ}\text{C}$ .) 19 parts, and liquid paraffin (sp.gr. 0.880) 40 parts, is substi-



tuted, in the same proportion, for the soft paraffin. (See also p. 202.)

**Brilliant Green for Skin Grafting.** (*Lancet*, 1917, 2, 5.) S. R. Douglas *et al.* draw attention to the value of brilliant green in preparing a granulating surface for a graft. A wet dressing of brilliant green solution (1 : 1000) enclosed in oiled paper is firmly bandaged on. It acts as a stimulant to the growing epithelium, prepares the surface, and keeps down the bacterial flora. It can be used with success instead of Locke's solution a few days after the grafting. In this way the number of wounds that can be satisfactorily grafted is greatly increased, and if not the whole, at least a part of the wound can be dealt with. The authors employ novocaine to produce local anaesthesia and nerve blocking. Stress is laid on the importance of careful after-treatment, and on the provision of some material for holding the grafts in position and allowing the escape of discharges. The scars resulting from this method of grafting are more elastic and stronger than with Thiersch's method.

**Calcium Carbonate Injections for Epilepsy.** (*Presse méd.*, 1917, 91.) The intraspinal injection of insoluble substances, such as calcium carbonate, is advocated by A. Carniol. Drugs usually injected into the spinal canal are soluble, and in consequence are largely absorbed at the level of injection; these are, therefore, not adapted to the direct treatment of the cerebral tissues through circulation of the cerebrospinal fluid. Insoluble substances so injected have, however, a distinct effect on cerebral disturbances. Injection of calcium carbonate, 0.3 to 0.7 Gm. in 1 c.c. of distilled water or olive oil, produces an immediate change in the condition of epileptic patients, reducing the number of spasms and increasing the intervals between spasms. Such a suspension does not become hypertonic, and the carbonate dissolves very gradually in the cerebrospinal fluid, and comes in contact with the cerebral cortex in a prolonged, steady manner.

**Calcium Chloride Intravenously for Tuberculosis.** (*New York Med. Jour.*, 1917, 106, 116.) T. J. Beasley comments on the relation of calcium deficiency to tuberculosis, and the infrequency of the disease among lime workers; and having found that calcium chloride may be administered intravenously over long periods without any apparent harmful results, recommends this

form of treatment. The dose must be adjusted to meet the individual requirements of different patients, taking into consideration the body weight, as well as the individual toleration to calcium as ascertained by the coagulation time of the blood. A dose of one grain may be given as a start, gradually increasing until a maximum dose of 6 grains has been given. At this point the dose is slowly decreased as the coagulation time shortens, and that amount is given which will maintain the coagulation time at normal or slightly less. Injections have been continued from 6 months to 1 year. Directions are given for the preparation of a pure, neutral, and sterile solution of calcium chloride. Results have been surprisingly good : of 120 cases, 40 were cured, in 18 the disease was arrested, and 21 improved ; the best results were obtained in incipient and moderately advanced cases.

**Carbolic Acid and Iodine for Goitre.** (*Med. Record*, 1917, 92, 591.) J. E. Sheehan reports on the treatment of goitre by means of injections containing equal parts of carbolic acid, iodine, and glycerin. A dose of 5 minims of this mixture is injected into the most prominent part of the goitre every 5 days. Seventeen cases are reported. Such injections cause a reduction in the size of the thyroid and a relief of the symptoms without any untoward manifestations. It is advisable to combine this treatment with a course of arsenic and phosphates.

**Chaparro and Simaruba for Amoebic Dysentery.** A series of experiments to determine the value of chaparro amargosa, or bitter bush (*Castela Nicholsoni*), in the treatment of dysentery is reported by S. Shephard and D. G. Lillie (*Lancet*, 1918, 1, 501). A number of carriers of *Entamoeba histolytica*, nearly all of whom had proved resistant to emetine bismuth iodide, and who were all passing cysts, were selected and treated with chaparro. Various parts of the plant were used : (1) twigs and leaves ; (2) root bark ; (3) decorticated root ; (4) a crystalline bitter principle obtained from the drug. A heaped teaspoonful of the powdered drug was boiled with 20 ounces of water for from 15 to 30 minutes, and this quantity of decoction was given thrice daily by the mouth, half an hour before meals, and twice daily, at 10 a.m. and 6 p.m., by enema. The treatment, which in most cases lasted 10 days, was not commenced until at least 3 weeks after the emetine treatment had been

discontinued. Before commencing treatment the bowels were opened with magnesium sulphate, and light diet given.

The results were as follows :—Twigs and leaves—7 cases : 4 cured. Root bark—30 cases : 11 cured. Root—27 cases : 13 cured. Bitter principles—3 cases : none cured. A "cure" was not pronounced until after at least six negative stool examinations. A few of the patients suffered from vomiting. When a first course failed, a second seemed to be of little use.

The root-bark of *Simaruba officinalis*, or mountain damson, which has a reputation as a remedy for dysentery, was also tried by the same investigators. A decoction was made in the same way as that of chaparro, using a "handful" of the broken bark to 20 ounces of water. This was given in the same way. Seven cases were treated and three cured.

**Chaulmoogra Oil Hypodermically for Leprosy.** (*J.A.M.A.*, 1917, 68, 1960.) N. Bercovitz reports on the treatment of leprosy by Heiser's method of hypodermic injections of chaulmoogra oil. The formula is : Chaulmoogra oil, 60 ml. ; camphorated oil, 60 ml. ; resorcin, 4 Gm. This mixture is sterilized and injected under the skin of the arms or legs, beginning with 1 ml. and repeating at weekly intervals. After 3 weeks the dose was gradually increased until 3 ml. was given weekly. After the first injection only there was a slight reaction—headache, malaise, and a suggestion of nausea : no further reaction occurred and there was no local reaction. The patients were given sodium bicarbonate baths three times a week, and a compound iron and arsenic pill was given once in 2 weeks. Weekly injections were continued for 9 months. All patients were much improved. The author considers this method to be effective : the tubercular forms respond earlier than the anaesthetic forms, but the latter have improved also. Large ulcers have healed with the formation of clean scar tissue.

**Chlorine Gas for Scabies.** (*B.M.J.*, 1917, 2, 113.) G. H. Clarke and H. S. Raper discovered accidentally that during the training of troops in anti-gas measures, involving exposure to chlorine gas, the number of cases of scabies diminished. Investigation showed that chlorine gas had a powerfully destructive effect on the parasite. A large number of officers and men suffering from scabies were treated with the gas. They were

exposed to chlorine gas (1 to 2 parts per thousand of air), the service gas helmet being worn as a protection. The exposure was for 5 minutes on successive days for 4 days. The men had a bath on the first and fifth days. The treatment was carried out in a room of 1000 cub. ft. of air space, the chlorine being delivered into this from a cylinder until the desired concentration was produced. This was determined by drawing with a syphon a measured volume of air through 5 per cent. sodium iodide and titrating the iodine liberated with sodium thiosulphate, each ml. of the latter being equal to 1 volume of chlorine per thousand volumes of air. The acarus is affected by the chlorine getting into its burrows, or perhaps the combination of chlorine and the outer layers of the skin produces hydrochloric acid. The authors have found the treatment an economical and efficient way of dealing with cases of scabies in the army.

**Chlorine Treatment of Typhus.** (*Bull. de la Soc. méd. des hôp.*, 1917, 41, 1200.) D. Danielopolu finds that a chlorinated saline solution can be prepared for intravenous injection which is practically innocuous. It contains 6.5 Gm. sodium chloride and 0.4 Gm. chlorine to the litre, and is prepared by passing chlorine gas through decinormal soda solution to free it from acid, and then into distilled water till the required strength has been obtained, after which the sodium chloride is added. Protected from light, this solution keeps for several days. Over 1000 intravenous injections have been given, with no ill effect except the chill which always follows. The dose never exceeded 500 c.c., and 90 per cent. of the patients so treated recovered, some of the cases being quite grave.

**Colloidal Manganese for Furunculosis.** (*B.M.J.*, 1918, 1, 446.) Sir Malcolm Morris has obtained remarkable results from the use of "collosol" manganese in four cases of boils. Intramuscular injections were given, and there was no reaction. The "collosol" was first used in the form of a single solution, but later the improved form—two solutions, which are mixed in the syringe—was used, a smaller dose being necessary in this form. The dose varied from 0.5 to 1 c.c. of the new form, and from 1.5 to 2.5 c.c. of the single solution. All four cases made rapid recovery.

J. E. R. McDonagh (*Med. Press*, Dec. 5, 1917) has also obtained good results in staphylococcic infections from intra-



muscular injections of colloidal manganese. Often one injection (3 ml.) will clear up all the boils in 3 days, improvement being distinctly manifest in from 12 to 24 hours after injection. Should there be a likelihood of more injections being required, the course should be begun with 1.5 ml. This dose is repeated the next day, and 3 ml. given a few days later. With doses under 3 ml. the patient is not inconvenienced: that dose and upwards may cause slight reaction. If the boil contains pus it comes to a head, discharges, and heals rapidly; if little or no pus, it aborts.

**Creosote Carbonate and Quinine for Pneumonia.** (*New York Med. Jour.*, 1917, 106, 170.) C. M. Nice has given a combination of quinine hydrochloride (5 grains) with creosote carbonate (5 to 7 minims) in pneumonia with surprisingly good results. This was given every 3 hours, and the dose decreased according to age. Thirty-two cases are reported, the ages ranging from 1 year to 68; there was 1 death, but all the others recovered. All patients took kindly to the treatment, and there were no symptoms of cinchonism, gastric discomfort, or urinary changes. Fresh air and forced feeding were adjuncts of the treatment. The most remarkable point was the rapidity of the crisis, which in a number of cases was replaced by a 24-hour lysis, and in none did the frequent shock and depression, usually associated with a crisis, appear. In 32 control cases, under ordinary treatment, the duration was much longer.

**Dichloramine-T as a Wound Dressing.** (*B.M.J.*, 1917, 2, 249.) J. E. Sweet reports on the treatment of some 80 cases of wounds with oil solution of dichloramine-T (see *Y.B.*, 1917, 167). The wound was sprayed with this solution once in 24 hours. He finds that this method is very effective, while it saves the pain of dressing and effects economy in dressing material. The amount of solution is small in bulk,—a consideration in field work; the number of wounds that can be dressed in a given time is much greater than by any other method; and the elimination of the Carrel apparatus simplifies the dressing and the problem of transportation, and saves the time occupied in periodic flushing.

**Emetine by Intramuscular Injection.** (*Lancet*, 1917, 2, 258.) P. Figdor, having found the pain produced by hypodermic injections of emetine a great drawback to their use, has tried

intramuscular injections with success. The best sites are on the upper arm over the deltoid and in the gluteal region. A prolonged course of treatment can be given in this way without any inconvenience to the patient. There is no pain, and sometimes only a little tenderness over the site of injection 24 hours afterwards. Injections may be given on alternate arms day by day. There is no swelling, induration, or discoloration of the skin, and scarring is minimal or absent. As there is probably less precipitation, through more rapid absorption, the efficacy of the drug is possibly increased. The same site may be used repeatedly at intervals of 48 hours.

**Emetine Bismuth Iodide for Amoebic Dysentery.** (*B.M.J.*, 1918, 1, 116.) A. C. Lambert reports on the use of emetine bismuth iodide in 40 cases of amoebic dysentery among Indian soldiers in Mesopotamia. Pills containing 2 grains were given once or twice a day; the maximum single dose of 3 grains was never exceeded. There was little trouble from vomiting. The author concludes:—

1. That we have in emetine bismuth iodide a combination of considerable potency in the treatment of amoebic dysentery, particularly when the amoebae are assuming their resistant stage. When given in pill form in doses not exceeding 2 grains its emetic effects are slight, at all events in Indian cases. Its use in conjunction with hypodermic injections of emetine hydrochloride in acute amoebic dysentery would seem to be beneficial in that convalescence is established earlier, and patients are less likely to become “carriers.” It cannot be considered in the light of a substitute for emetine, as attempts to treat acute cases with it alone ended in failure, until emetine was used in addition.

2. In “carriers,” and in those convalescents who continue to harbour cysts, emetine bismuth iodide should prove superior to emetine, and it would seem a wise proceeding, from a public health point of view, to subject all cases of amoebic dysentery to a course of emetine bismuth iodide during convalescence.

**Emetine Bismuth Iodide and Dysentery Carriers.** (*Lancet*, 1917, 2, 73.) W. Waddell *et al.* report on the treatment of the 102 carriers of *Entamoeba histolytica* with emetine bismuth iodide. The form used was a keratin-coated tablet containing 1 grain of the salt. A daily dose of 3 such tablets was

given after the midday meal, and followed by a period of rest. A full course extended over 12 days, and amounted to a total of 36 grains. The effect in practically all cases was either purging or vomiting, or both. Stomach and bowel sedatives were tried to control this irritation, but none were of any real use except opium, which was used only in extreme cases. The drug was tried in powder, but the irritation was more intense. Observations on the patients showed that the drug was more effective than the hydrochloride, but that about 20 per cent. of the cases were failures. The intensely irritating effects are a drawback to its use, and until the preparation has been improved it is difficult to form a just estimation of its value. Cases should be kept under observation for at least 14 days after treatment.

(*Ibid.*, 1917, 2, 418.) D. G. Lillie and S. Shephard, in a report to the Medical Research Committee, show that emetine bismuth iodide, when given in the form of salol-coated pills, acts better than when given as keratin-coated tablets; there is also less vomiting and less loss of weight. Previous injections of emetine hydrochloride appear to render carriers less liable to cure by emetine bismuth iodide, the percentage of cures being lower in cases where such injections had been given. Some carriers appear to resist emetine in any form. When vomiting is produced by emetine bismuth iodide, this does not seem to diminish the chance of cure (see also *Y.B.*, 1917, 181).

H. L. Watson-Wemyss and T. Bentham (*Lancet*, 1918, 1, 403) are of opinion that neither emetine hydrochloride nor emetine bismuth iodide can alone be relied on to remove cysts, but they obtained considerable success by combined treatment. Emetine hydrochloride was given hypodermically in 1-grain doses each morning for 5 days, while emetine bismuth iodide was given in pill (3 grains) each evening for 12 days. The depressing effect of the hypodermic emetine was combated by combination with  $\frac{1}{10}$  grain strychnine. The pills were coated with a double layer of salol varnish (salol, shellac, and ether). Vomiting was rare, and was usually due to either insufficient coating of the pills, or too generous diet on the part of the patient; when it occurred it was checked by means of hydrocyanic acid or potassium bromide. The treatment must be rigidly watched, and the physician must make sure that the patient actually swallows the pills: many cases of relapse are due to failure to take the pills.

**Eusol Injections in Children.** (*Edinburgh Med. Jour.*, 1917, 19, 143.) J. L. Smith, J. Ritchie, and T. Rettie, in a report to the Medical Research Committee, show that eusol can with safety be injected intravenously. They have tried its effect so given in the treatment of the toxæmia forming part of the symptoms of ordinary bacterial infections in children. The infections which were benefited by the method include lung infections, broncho-pneumonia, empyema, toxic diarrhoea, appendicitis, and chronic meningitis. No benefit was obtained in cases of rheumatism, chorea, and tuberculosis. The success of the application depends essentially on the reaction of the patient: the benefit may be either direct through the destruction of circulating toxin, or indirect in the sense of stimulating a protective reaction. Standard eusol was employed, 1 c.c. of which is equivalent to 1 c.c.  $\frac{1}{10}$  normal sodium arsenite solution, and the dose varied from 10 c.c. to 75 c.c. When eusol is cautiously administered no untoward effects follow.

**Flavine as an Antiseptic** (see *Y.B.*, 1917, 168). A large amount of literature has appeared on the properties of flavine, much of it being contradictory. In a report to the Medical Research Committee (*B.M.J.*, 1917, 2, 70), C. H. Browning *et al.* find that flavine compounds (acriflavine and proflavine) are antiseptics that exert a slowly progressive bactericidal action. Concentrations that inhibit and kill bacteria are without harmful effect on phagocytosis or on the tissues locally or generally, hence their suitability for wound treatment. Flavine compounds are enhanced in their bactericidal potency by the presence of serum.

A. Fleming, on the other hand (*Lancet*, 1917, 2, 341), holds that the claims made for flavine are based on fallacious experiments, that the theoretical basis for its use is thoroughly unsound, and that there seems nothing specially to recommend it as an antiseptic for use in septic wounds. Flavine, he says, strongly agglutinates human red corpuscles; it has a strongly anti-coagulant effect on human blood; it completely inhibits leucocytic emigration in a concentration of 1 : 2000, and has a very destructive action on leucocytes; it will allow organisms to grow in serum under certain conditions, and in some cases appears to aid their growth; injected intravenously, it at once disappears from the blood and is taken up by the tissues, which become yellow, but acquire no inhibitory power on the growth of bac-



teria. The so-called "therapeutic coefficient" of flavine can be made to vary enormously according to the experimental method employed.

R. T. Hewlett (*Lancet*, 1917, 2, 493) describes experiments made on the germicidal power of flavine. He says that its value in this respect comes out very much lower than that stated by Browning and his co-workers. The difference between their results and his is probably due to the use in his (Hewlett's) experiments of a much larger number of organisms than were employed by the other investigators. The results with pus are particularly poor, and many disinfectants equal or surpass flavine, and have the advantage of a much more rapid action.

A further contribution to the same effect comes from E. F. Bashford *et al.* (*B.M.J.*, 1917, 2, 849). Fifty cases were selected for a trial of both acriflavine and proflavine, and these were compared carefully with another 50 in which the Carrel-Dakin method was adopted. The results were generally unfavourable to the flavine treatment, which, the authors say, is associated with (1) small formation of pus; (2) slow epithelial growth; (3) delay in process of repair; (4) lingering of organisms on the wound surface; (5) some diminution in the local and general reaction to infection.

E. M. Pilcher and A. J. Hull (*B.M.J.*, 1918, 1, 172) say that flavine in the form of a 1 : 1000 solution is practically "fool-proof," can be used by any one, and is easy to prepare and apply. It shows its value when large numbers have to be dressed, as there is early cleansing of the wound, no absorption, and speedy reduction of temperature, while more than a third of the cases reach the difficult suture ideal. The authors do not deny that there may be some delay in healing, but there is less local and general reaction, and no skin irritation nor dermatitis as in the case of the hypochlorite. Flavine is not reduced in power by contact with serum, and the authors invariably found healthy granulations with epithelial growth.

W. P. Morgan (*Lancet*, 1918, 1, 256; Feb. 16) finds that acriflavine is, as regards both antiseptic and toxic properties, more potent than proflavine. Its action is strikingly selective, being very marked on streptococci, less so on staphylococci, and insignificant on some other organisms. It has a marked but slow toxic action on the tissue, but a weak solution (1 : 4000) is not sufficiently toxic to prevent its use as a dressing in wounds with streptococci or staphylococci.

\* An unfavourable clinical report on flavine is published by W. Pearson (*Lancet*, 1918, 1, 370 ; Mar. 9). A 1 : 1000 solution in sterilized normal saline was used in a number of cases. A description is given of the cases in which it was tried, and certain general observations on its use are detailed. The following are the author's conclusions :—“(1) In cases where infection and sepsis are active and uncontrolled the use of flavine following suitable operative measures has no beneficial effect on the subsequent progress of the case in so far as the control of sepsis is concerned. Any slight differences observed were unfavourable. (2) In cases where sepsis has already been controlled and repair has begun flavine acts injuriously, chiefly by producing an unhealthy granulating surface. While these conclusions do not prove that flavine may not possess powerful germicidal properties in certain experimental conditions, I believe they show that its clinical use is not attended with good results. Since completing my observations I have entirely abandoned the use of flavine in my work.”

**The Therapeutics of Garlic.** (*Practitioner*, 1918, 100, 145.) W. C. Minchin reminds his readers of the value of *Oleum Allii*, the active oil of garlic, especially of two of its more important properties : (1) its great volatility, and (2) its power of penetration. The first makes it of value in pulmonary diseases, while the second allows it to exert its antiseptic qualities. *Oleum allii* can destroy germs without injuring the tissues, and is of value in typhoid, typhus, and diphtheria. In diphtheria it can be given in the form of the succus allii, or fresh juice, 60 minims every 4 to 6 hours in beef tea or syrup, or a small portion of the bulb can be kept in the mouth and slowly chewed. It may be diluted with any fluid, or prepared with jelly and dispensed in wide-mouthed bottles from which a little can be taken occasionally. An inhalation containing oleum allii is useful in many pulmonary conditions, septic and tuberculous. Internally, a teaspoonful of the expressed juice or 2 drops of the essential oil may be given 3 times daily ; externally, poultices of the crushed bulbs or garlic ointment, 50 per cent. juice in vaseline, applied daily. The latter is useful in cases of anthrax carbuncles, and boils. An excellent dressing for burns is made by adding 20 per cent. of filtered succus allii to carron oil.

**Iodine as a Water Sterilizer.** (*Prescriber*, 1918, 12, 97.) The following method of water sterilization with iodine is advocated

by A. Gasecard and G. Laroche:—1 c.c. of tincture of iodine (French Codex or tinct. iodi fortis. B.P.), is diluted with 9 c.c. of alcohol. Into a series of tumblers, numbered from 1 to 5, and each containing 100 c.c. of the water to be sterilized, are dropped, respectively, 1, 2, 3, 4 and 5 drops of the dilute iodine tincture. The contents of each tumbler are shaken up. After 20 minutes a little starch paste is added to each glass. Several of the specimens will then acquire a blue colour. Adding three to the smallest number of drops of iodine required to produce a blue colour, gives the number of drops (from the same dropper) of undiluted tincture of iodine which must be added to 1 litre of water to sterilize it. To remove the taste of iodine from the water, as many drops of a 10 per cent. solution of sodium thio-sulphate as have previously been used of tincture of iodine are added. Water so treated has no unpleasant taste.

**Iodoform Emulsion for Tuberculous Joints.** (*Practitioner*, 1918, 100, 9.) H. F. Waterhouse recommends injections of iodoform and glycerin emulsion (10 per cent.) for treatment of tuberculous joints. The action of this valuable remedy is due to nascent iodine injected into the joint cavity, or into the synovial membrane, producing a fibrosis, and leading to an encapsulation of the tuberculous focus. The injection of the emulsion may be repeated frequently. Not more than 30 grains of iodoform should be given at one injection, that is 5 drachms of the emulsion, for fear of causing iodoform poisoning. Its value is particularly great in treating tuberculous abscesses, especially in connexion with disease of the spine.

**Lythrum Salicaria for Enteritis.** (*Bull. et Mém. Soc. méd. des hôp. de Paris*, Oct. 25, 1917.) H. Dufour recommends a fluid extract of *Lythrum salicaria* (spiked loosestrife), 12.5 Gm. of which is added to 480 Gm. of syrup and 4 to 6 teaspoonfuls of the mixture given daily to infants. In adults 3 Gm. of the extract may be given daily. The action appears to be due to a special variety of tannin present in the plant. (See also *Index*.)

**Magnesium Sulphate Cream for Wounds.** (*B.M.J.*, 1918, 1, 342.) A. E. Morison refers to previous work by himself and Tulloch on the treatment of wounds by magnesium sulphate (see *Y.B.*, 1917, 185). He now recommends a cream containing dried magnesium sulphate, 24 ounces, and glycerin of carbolic acid (1 : 10), 11 ounces. This cream is very hygroscopic,

and should be kept in suitable jars. The wound is packed and thickly covered with the cream, and left for 3 or 4 days. A profuse discharge of serum is noticed. After a few dressings a bright granulating surface presents itself, when the dressing may be changed to magnesium sulphate solution (see *Y.B.*, 1917, 185) for a few days. The method is simple, inexpensive, and gives rise to no constitutional disturbances. Its sphere of action is confined to the first stage, after which other remedies should be resorted to.

**Mercuric Benzoate for Syphilis.** The employment of an emulsion of mercuric benzoate as an intramuscular injection in syphilis is advocated by M. F. Lautman (*Med. Record*, 1917, **91**, 60). Mercuric benzoate,  $\text{Hg}(\text{C}_6\text{H}_5\text{COO})_2 \cdot \text{H}_2\text{O}$ , is a white powder insoluble in water. Lautman makes an emulsion containing 10 per cent. of this salt and 2 per cent. quinine-urea hydrochloride in white soft paraffin. Such an emulsion, when injected intramuscularly, is no more painful than any of the other preparations in use, and permits of the exhibition of 3 grains of the salt each week. In this salt the mercury is not a free ion, but being in combination with an organic substance is considered less toxic. One grain is given at a dose, and repeated 3 times a week. Injection is made from an all-glass syringe, and the site of injection is well massaged for a few minutes to ensure distribution of the injected material. What little pain there is is usually well tolerated: it generally starts about an hour after injection, and lasts for 5 or 6 hours.

**Mercuric Chloride for Enlarged Spleen.** (*Indian Jour. Med. Research*, 1917, **5**, 401.) Greig and Ritchie administered intravenously 11 c.c. of a 1 : 1000 mercuric chloride solution in normal saline on alternate days; and a daily dose of 30 grains quinine in three portions was given by the mouth. The injections covered a fortnight—8 doses being given—and were then stopped, but quinine was continued for another week to all the patients and a final inspection of the spleens was made at the end of the third week. Sixteen cases of the combined treatment series showed a two-fingers reduction in size of spleen as compared with eight in the case of quinine alone.

**Mercuric Cyanide for Dysentery.** (*Revista Assoc. Med. Argentina*, Mar. 1917.) D. Varsi has given mercuric cyanide by intravenous injection for two years in the treatment of both



amoebic and bacillary dysentery. The initial dose is 0.01 Gm., and if this is well tolerated 0.015 Gm. is given on the following day, and repeated on the third day. Should there not be a distinct improvement on the fourth day, 0.02 Gm. is given, but this fourth dose is rarely necessary. An accurate diagnosis is important, there being many cases of enterocolitis which are not benefited by the treatment. The intravenous injections may be given alone, or they may be supplemented by the usual measures for the relief of pain.

**Mercury Oxycyanide injections for Trachoma.** (*British Jour. Ophthalmology*, 1918, 2, 135; Mar.) J. Kirke advocates the use of mercury oxycyanide (1 : 3000) with acoin as a sub-conjunctival injection for trachoma. The reaction is very marked, but passes off completely in a few days. He has treated nearly a hundred patients by this method; they were invariably enthusiastic about it, the internal nutrition of the eye structures being improved. Combined with the local application of sulphate of copper it is better than other forms of treatment, e.g. carbon dioxide snow, Finsen rays, radium, etc.

**Methyl-Violet and Brilliant Green for Skin Sterilization.** (*B.M.J.*, 1918, 1, 562.) V. Bonney and C. H. Browning, in view of the fact that iodine does not completely sterilize all the bacteria-bearing regions of the skin and is irritating, use the following solution for this purpose: Crystal violet (hexa- or penta-methyl violet, or a mixture of these), 1 part; brilliant green (zinc sulphate-free), 1 part; rectified spirit, 100 parts; water, 100 parts.

The dyes are dissolved in the spirit and the water added. The mixture is painted over the operation area 6 hours before operation; a compress of lint soaked in the same solution is applied, covered with waterproof batiste, and supported by a bandage. This is removed before operation, and no further painting is done. The skin is stained an intense violet-black, which remains during operation and some time after; the stain may be removed, if desired, by means of eusol.

**Methylene Blue for Vincent's Angina.** (*Lyon. médica*, 1918, 127, 3.) Among 225 men with sore throat sent to the contagious diseases hospital, Deglos found 21 cases of Vincent's angina or "trench throat." The men were usually young, and the onset of the angina had been insidious. Good results were obtained

by repeated application of a 10 per cent. solution of methylene blue after clearing out the contents of the ulcer and swabbing with a solution of silver nitrate. In rebellious cases a single intravenous injection of neosalvarsan (0.3 Gm. in 2 or 3 c.c. of double distilled water) led to a complete healing up in from 4 to 6 days.

**Mutton Bird Oil for Phthisis.** Owing to the difficulty in obtaining cod liver oil, J. S. Purdy (*B.M.J.*, 1918, 1, 174) draws attention to the value of the oil procured from the sooty petrel or mutton bird. He has found it to be beneficial for bronchitic conditions and phthisis. The young bird is lined with fat, and this is expressed to produce the oil. Patients fed on mutton bird itself gain weight quickly and satisfactorily. The supply of oil from this source is considerable, and steps are being taken to preserve the bird from extinction. Especially at the present time it forms a welcome addition to the medicinal oils.

**Paraffin Treatment of Burns** (see *Y.B.*, 1917, 187). A. J. Hull (*B.M.J.*, 1917, 2, 788) deals with the use of antiseptics in connexion with this treatment, the introduction of new non-irritant antiseptics having led to several modifications of the method. He finds that the best method is to paint the burn with a solution of an antiseptic before applying the paraffin. The best antiseptic is, he finds, acriflavine, a solution of 1 : 1000 being used. Eusol is too irritating; brilliant green causes unhealthy granulations; scarlet red is useful only when the burn is clean and requires stimulation, an aqueous solution of from 1 to 10 per cent. being used. He gives the following formulae:—

*No. 7 Paraffin.*— $\beta$ -naphthol, 0.25; eucalyptus oil, 2.0; olive oil, 5.0; soft paraffin, 25.0; hard paraffin, 67.75.

*No. 10 Paraffin.*—Scarlet red, 0.2; eucalyptus oil, 2.0; olive oil, 5.0; hydrous wool-fat, 4.0; soft paraffin, 21.0; hard paraffin, 67.8.

*No. 11 Paraffin.*—As No. 10, at the expense of the soft paraffin.

*No. 12 Paraffin.*—As No. 7, but with brilliant green, 0.05 per cent.

*No. 13 Paraffin.*—As No. 7, but with flavine, 0.2 per cent.

*No. 14 Paraffin.*—As No. 7, but with dichloramine-T, 0.2 per cent.

In the *Jour. Amer. Med. Assoc.*, 1917, 69, 1525, appears a description of the paraffin required for film treatment, known as "surgical paraffin" or "plastic paraffin." It is required

to be more ductile and pliable than the official (U.S.P.) paraffin, and to be liquid at or below  $50^{\circ}\text{C}$ . ( $122^{\circ}\text{F}$ ). A thin film, when prepared and tested as described below, should be pliable at or below  $28^{\circ}\text{C}$ . and ductile at or below  $31^{\circ}\text{C}$ . At body temperature ( $38^{\circ}\text{C}$ .) it should be pliable, and adhere to, but permit ready detachment from the skin.

*Test.*—The pliability and ductility of paraffin are determined as follows :—A little of the melted substance is poured on water having a temperature of about  $40^{\circ}\text{C}$ . so as to form a number of separate films. The temperature of the bath is then gradually lowered by the addition of cold water to determine the pliability and ductility. Pliability test.—The film while immersed in water is doubled on itself and the temperature of the water observed at which the film breaks sharply on *one* fold. Ductility test.—The film is stretched while under water, and the temperature of the water noted at which the film breaks sharply and evenly.

A small surface of the forearm is painted with melted paraffin, covered with a thin layer of cotton, another coat of paraffin painted on the cotton; and then dressed with cotton and bandage. After 1 hour the film should remain attached to the skin, showing it is adherent, but be easily removable.

**Pituitary Extract for Intestinal Paralysis.** (*Bull. de L'Acad. de Méd.*, 1918, 79, 52.) E. Kirmisson finds pituitary extract useful in the paralysis of the intestine which frequently follows operations for appendicitis. He describes a typical case in a girl of over 10 who had no movements of the bowels for 6 days after removal of a gangrenous appendix. The abdomen was enormously distended, and neither lavage of the stomach, enemas, nor castor oil suppositories had any effect on the symptoms of acute peritonitis. Then a subcutaneous injection of pituitary extract induced a small passage, and repeating the injection on 2 successive days, dissipated the alarming symptoms. He used a French preparation of the posterior lobe of the pituitary body.

**Potassium Iodide in Trench Foot.** (*J.A.M.A.*, 1918, 70, 455; *Lancet*, 1918, 1, 564.) Joshua E. Sweet *et al.* produce evidence to show that trench foot, so far from being a local infection communicated from the outside, has its origin in the interior of the body, and that the infections which mark the course of the disease are but the natural secondary manifesta

tions of the reaction of devitalized tissues to infective agents. Local treatment, therefore, should be concerned with surgical conditions arising from these secondary infections. The authors find that trench foot is accompanied by vasomotor disturbance, there being always a marked increase of blood pressure in the leg as compared with the arm. They conclude that trench foot is a disease incited by the effect of cold and inaction on a foot whose vasomotor system is physiologically impaired. They find that the administration of potassium iodide is an important addition to the treatment, for the prompt alleviation of pain if for no other reason. Doses of 20 to 30 grains, 3 times daily, cause a distinct fall in blood pressure, with relief of pain and of resulting insomnia.

**Potassium Iodide as an X-Ray Medium.** In a preliminary report D. F. Cameron (*J.A.M.A.*, 1918, **70**, 754) establishes the value of potassium and sodium iodide solutions as opaque media for X-ray work. His conclusions are as follows :—

1. A 50 per cent. solution of potassium or sodium iodide is almost completely opaque to the X-ray. If such a solution is for convenience called "full strength," the half and quarter strengths cast very definite shadows.

2. These solutions are made with little trouble or expense. They are stable, saline to the taste, but not irritating except on areas freshly denuded of epithelium. They are miscible with urine and blood without causing precipitation or coagulation. The simple aqueous solution is neutral in reaction and is easily sterilized by boiling.

3. Good X-ray photographs of the human bladder filled with a 15 per cent. potassium iodide solution, and of chronic sinuses filled with a 50 per cent. solution, have been made. No bad effects have been noted. A 25 to 30 per cent. solution should be sufficient for pyelography. Caution, however, should be observed in the use of these solutions in human subjects until further study of their effects has been made.

**Potassium Permanganate for Bromidrosis.** (*Amer. Jour. Clin. Med.*, 1918, **25**, 157.) C. S. Cope recommends solution of potassium permanganate as a remedy for bromidrosis. A stock solution is prepared containing 25 grains in 16 ounces of water and the patient uses a foot-bath made from 2 tablespoonfuls of this solution and a quart of warm water. The feet are first thoroughly cleansed with hot water and soap, rinsed in



clean water, then soaked for half an hour in the permanganate solution, and dried.

**Potassium Permanganate and Colloidal Manganese for Gonorrhoeal Sepsis.** (*Bull. Acad. Méd.*, 1917, 78, 428. S. Mélamet, believing that the antigonococcic action of potassium permanganate is due to its manganese content, has tried intramuscular injections of this salt and of colloidal manganese in 72 cases with successful results in 65 cases. Three permanganate solutions were used, containing respectively 1.66, 2, and 2.66 Mgm. in 1 ml. of distilled water. In acute urethritis, daily injections were made into the buttock, beginning with 1 ml. of the first solution, increasing by 1 ml. every 3 days to 5 ml.; next 2 ml. of the second solution was given for 3 days, increasing to 5 ml.; finally the third solution was used, stopping at the 3 ml. dose. Colloidal treatment consisted in daily injection of the contents of an ampoule of electric colloidal manganese. In most cases the injections caused localized burning, which usually passed off in 5 or 10 minutes. No urethral treatment was used.

**Quinine Application for Anal Fissure.** (*B.M.J.*, 1918, 1, 314.) Helen G. Leyton reports on a typical case of anal fissure which came under her care and refused operative treatment. After trying the usual palliative remedies without result, she packed the fissure with quinine hydrochloride (about 5 grains) after swabbing with cocaine solution. This treatment was repeated on each of 3 days. In 24 hours the surface showed well-marked granulations, and the patient's symptoms were much relieved. After the third day that part of the fissure within reach was looking healthy, but the patient complained of pain higher up. Enule cocaine (gr.  $\frac{1}{4}$ ) was given, followed in a quarter of an hour by enule quinine sulphate (gr. 5). These were used on 4 days, and by that time the fissure was quite healed and all pain and symptoms had disappeared; there has been no recurrence. The extension of this method of treatment to bullet wounds and other sinuses suggests itself.

**Quinine Injections for Broncho-Pneumonia of Children.** (*Practitioner*, 1917, 98, 581.) J. E. Measham records 17 cases of broncho-pneumonia in children, and emphasizes the importance of bringing to light any method of treatment which offers a prospect of reducing the high death-rate. He envelops the child's chest in a light Gamgee jacket, over which is worn

a woollen combination. No medicines are given by mouth, but a subcutaneous injection of quinine hydrochloride is given morning and evening, 1 grain in 10 minims of water. The dosage is as follows : Under 6 months, 5 minims ; under 1 year, 10 minims ; under 2 years, 15 minims ; over 2 years, 20 minims. The physical signs of the disease disappear rapidly, and the patient often returns to normal health 10 days after the first injection.

**Quinine-Urea as an Anaesthetic.** (*New York Med. Jour.*, 1917, 106, 1161.) J. F. Saphir reports on the use of quinine and urea hydrochloride as a local anaesthetic, particularly for rectal operations. He sums up the qualities thus :—

1. Quinine and urea hydrochloride is an ideal local anaesthetic, as it gives no pain during or after operation.

2. The anaesthesia lasts for a sufficient length of time—3 to 10 days—to permit the wound caused by the rectal operation to heal.

3. There are no toxic effects or symptoms even if used in very large quantities.

4. It acts as a haemostatic, diminishing danger of post-operative haemorrhage.

5. It is very easy to use, is soluble in water, and is easily sterilized.

6. For the production of local anaesthesia, never use a stronger solution than a one-third or 0.5 per cent., especially in skin work.

7. A 1 per cent. solution may be used in mucous membrane work, where sloughing, followed by the formation of cicatricial scar tissue, is desirable.

**Quinine-Urea Injections for Haemorrhoids.** (*J.A.M.A.*, 1917, 69, 1509.) E. H. Terrell has used quinine and urea hydrochloride on 313 patients in all, and has found it to be a valuable remedy. He uses a 5 per cent. solution, injecting the solution into one haemorrhoid daily until all are treated ; the injection is made into the body of the pile, just enough being injected to distend it slightly. About 50 per cent. of the cases with protrusion are relieved of this symptom immediately after all the tumours have received one injection. A fibrosis with local anaemia of the parts is produced. In properly selected cases pain is rarely felt during treatment. The author describes the results in different varieties of haemorrhoids, and insists strongly

that a thorough knowledge of rectal diseases is essential if one is to expect uniformly good results. Most important of all is a realization of the class of cases to which the treatment is suited, and its limitations.

**Quinine-Urea Injections for Pneumonia.** (*Edinburgh Med. Jour.*, 1918, 20, 227.) E. Matthew refers to recent experimental investigations in chemotherapy for pneumonia, which have centred round camphor and derivatives of quinine. He is not satisfied that the former influences favourably the course of the disease, but has had more success from quinine derivatives, of which quinine and urea hydrochloride has given best results. Twenty-four cases were treated by intramuscular (gluteal) injections, large doses (15 grains every 3 hours for as many times as seemed necessary) being given. The physician must be guided as to the number of doses, partly by the temperature, and entirely by the condition of the patient. The number of doses varied from 2 to 22, the larger number taking 3, 4, or 6 doses. The immediate effect is a marked fall in the temperature. Should no fall occur, or should the temperature rise again, the injections are repeated. In all cases the breathing becomes much easier, and all irritability and restlessness is checked. The distressing cough of pneumonia is relieved. Sleeplessness disappears, and in only a very few cases are hypnotics required. The patients require much less nursing attention, and the convalescence is quick, the involved lung clearing up very quickly.

**Quinine-Urea as an Escharotic.** A strong (30 per cent.) solution of quinine and urea hydrochloride is recommended by W. W. Babcock (*New York Med. Jour.*, 1917, 105, 385) as an escharotic. Such a solution causes, after injection, a burning sensation and then anaesthesia; later on the part becomes anaemic and then necroses, oedema occurring and the slough separating after a few days. Cavernous angioma, haemorrhoids, warts, urethral caruncle, and even small superficial epitheliomata have been so treated with good effect, and some of the successful cases had already failed under electricity and carbon dioxide snow. The affected area is infiltrated with a fine needle, care being taken not to inject too widely.

**Silver Nitrate for Impetigo Contagiosa.** (*J.A.M.A.*, 1917, 69, 176.) H. Morrow has found applications of silver nitrate useful in impetigo contagiosa. He uses a 20 per cent. solution,

which is applied to the base of the lesions after the vesicles have been ruptured with gauze and the sodden epithelium removed. The application causes temporary pain, and a black crust appears quickly and remains for several days, but these objections are of little importance in view of the value of the treatment. New lesions can usually be aborted by application of a solution of boric acid or weak mercuric chloride. Colloidal silver and organic silver preparations have no effect on impetigo.

**Silver Compounds and Argyria.** (*J.A.M.A.*, 1917, 69, 87.) G. M. Olson has found that a very unsightly permanent pigmentation of the skin (argyria localis) may sometimes follow the local use of argyrol and other organic silver preparations. This danger is not diminished by the use of freshly prepared solutions. While such argyria is uncommon, the blemish when it occurs is so unsightly as to demand that every care be taken in the use of such solutions. They should never be forcibly injected into any cavity or canal, as the tear ducts, urethra, etc., and should not be applied to broken skin. The condition is not absolutely irremediable: absorption of the silver may be promoted by local measures such as blistering and electrolysis, and the internal administration of hexamine in doses of 5 to 10 grains three times a day is not without benefit.

**Soap Solution in Wound Treatment.** (*B.M.J.*, 1918, 2, 80.) J. B. Haycraft calls attention to the value of a solution (1 : 40) of pure *sapo durus*. One part of soap is cut into shreds and dissolved into 20 parts of sterilized hot water, and this solution is mixed with an equal volume of sterile water when required for use. This solution easily permeates and comes into contact with the whole surface of the wound. It acts as a mechanical cleansing agent. Complete excision is impracticable in deep penetrating wounds, and these when treated with soap solution and primary suture heal well. Success depends upon getting cases within a few hours of being wounded (see also *Y.B.*, 1917, 190).

**Sodium Arsenate for Soft Chancre.** (*Bull. de l'Acad. de Méd.*, 1917, 78, 192.) Goubeau uses a 2 per cent. suspension of sodium arsenate in alcohol (95 per cent.) as an application in soft chancre. The chancre is painted with this daily, and when there is a complicating bubo this is injected with 1 or 2 c.c. of a 1 per cent. aqueous solution of the arsenate on alternate days. He finds



that by this method the average duration of treatment is very much shortened.

**Sodium Bicarbonate for Post-choleraic Uraemia.** (*Lancet*, 1917, 2, 745.) L. Rogers finds that the essential cause of post-choleraic uraemia is acidosis. He counteracts this by means of alkaline injections. Two solutions are used: (1) sodium chloride, 120 grains; calcium chloride, 4 grains; sterile water 1 pint (hypertonic saline); (2) sodium chloride, 60 grains; sodium bicarbonate, 160 grains; sterile water, 1 pint. Patients admitted early, without prolonged suppression of urine, are given the first solution only, the quantity being regulated by the sp.g. of the blood. When there has been suppression of urine for over 12 hours a pint of alkaline solution is given with each injection of the hypertonic saline. Details of the method are given, and the author claims to have effected a 70 per cent. reduction in the mortality from this affection.

**Sodium Carbonate for Diabetes.** (*J.A.M.A.*, 1917, 68, 1481.) In a review of recent contributions to the physiology of diabetes, the effect of sodium carbonate is discussed. The alkali has the effect of reducing the output of sugar in depancreatized dogs, and the employment of alkali is suggested on the ground of rational therapeutics. It is possible that the pancreatic hormone may prove to be a peculiarly adapted alkali produced by the islands of Langerhans, and this, in non-diabetic persons, may be responsible for the proper oxidation of sugar in the body. Administration of alkali in diabetes may thus facilitate the actual oxidation of glucose.

**Sodium Citrate for Pneumonia.** (*New York Med. Jour.*, 1917, 105, 740.) S. Stern considers that in the treatment of pneumonia, in order to bring about a return to normal conditions of pulmonary and tissue metabolism, the organic acids of food are of value, and citric acid is, he thinks, the best of these for the purpose. He gives 120 grains of sodium citrate every 2 hours in eight ounces of water, and has had good results in 24 cases. The salt is converted in the system into sodium carbonate, an element essential to body metabolism.

**Sodium Cyanide as a Stimulant to Respiration.** (*Arch. Internal Med.*, 1918, 21, 109.) A. S. Loevenhart *et al.*<sup>1</sup> have obtained good results from intravenous injections of a 0.1 per cent. solution of sodium cyanide in normal saline solution. The sodium

salt is preferred to that of potassium, on account of the depressing effect of the latter on the heart. In every case (15 injections) marked stimulation of the respiration was obtained within 20 seconds, and the stimulation could be controlled accurately by the rate of injection. When a mild and continuous stimulation is required, a slow, continuous injection of 1 c.c. in from 30 to 15 seconds is given. The factor of safety is sufficiently large for clinical purposes; but warning symptoms such as pallor, nausea, marked increase of pulse rate, and the depression of respiration that follows too rapid injection or too large a dose, call for stoppage of the injection. The effects are transient, presumably because the cyanide is converted into the non-toxic sulphocyanate. The treatment is expected to prove useful in (1) depression of respiration caused by intracranial pressure; (2) resuscitation from drowning; (3) embarrassment of respiration under anaesthesia; (4) other forms of respiratory depression, when it may be given in addition to artificial respiration.

**Sodium Gynocardate for Leprosy.** (*Indian Jour. Med. Research*, 1917, 5, 277.) L. Rogers reports further experience in this treatment. He has now found that the most active salts are those of the higher melting point acids. A 3 per cent. solution is used (1 grain in 2 c.c.), and dose is  $\frac{1}{2}$  grain, gradually increased to  $2\frac{1}{2}$  grains. Injections are given once or twice a week, and on the other days 2 grain pills or tablets of the drug may be taken by the mouth after meals, beginning with one 3 times a day, and increasing by one daily, until ten or twelve are taken each day. Localized clotting sometimes follows the intravenous injections: this may be avoided by the addition to the solution of  $\frac{1}{2}$  per cent. sodium citrate. Lengthy treatment, often as much as a year, is required, but the results have been most promising (see also *Y.B.*, 1917, 190).

**Sodium Persulphate for Tetanus.** (*Surgery, Gynec., and Obstet.*, Dec. 1917.) L. Leyva has tried intravenous injection of a 5 per cent. solution of sodium persulphate in cases of developed tetanus. Three cases were treated, one of which was severe. The solution is freshly prepared and injected in daily doses of 60 c.c., this quantity being given in two or more portions. The liquid is introduced slowly, at least 5 minutes being allowed. Sometimes a reaction appears, nausea and vomiting supervening for a short time, but the relief to the patient is

great. It is worthy of note that only three cases are reported, also that antitetanic serum was also employed in all three.

**Starch Iodide for Infected Wounds.** (*Presse médicale*, Sept. 20, 1917.) A. Lumière finds that the application of starch iodide to wounds, especially to those of the soft parts, causes very rapid sterilization of the wound. In deep wounds successful results were secured by irrigations of starch iodide after the method of Carrel. The solution employed consisted of soluble starch, 25 Gm.; boiling water, 1000 Gm.; iodine iodide solution (1 : 1000), 50 c.c. This fluid seems to possess antiseptic power of the same order as Dakin's solution, and is not irritating to the skin.

**Stovaine and "Twilight Sleep."** (*Lancet*, 1918, 1, 152.) F. L. Provis finds that stovaine injections are a valuable aid to scopolamine anaesthesia or "twilight sleep" in gynaecology. His method is as follows: An hour and a half before operation a hypodermic injection of hyoscine,  $\frac{1}{200}$  grain, is given; this is followed  $\frac{3}{4}$  hour later by an injection of hyoscine,  $\frac{1}{100}$  grain, with morphine,  $\frac{1}{4}$  grain, and atropine,  $\frac{1}{60}$  grain. Immediately preceding operation 0.5 to 0.7 c.c. of stovaine solution (10 per cent.) in normal saline is injected into the subarachnoid cavity between the second and third, or third and fourth, lumbar vertebrae. After injection the patient is blindfolded, her ears stopped with cotton wool, and she is told that she will go to sleep. A skilled operator is essential for the stovaine injection, and the patient must be kept very quiet and in a darkened room for half an hour prior to operation.

**Sugar: its Value in "Malarial Heart."** (*Med. Press*, 1917, 2, 119.) J. C. McWalter has found that men returning from the Eastern theatre of war after an attack or several attacks of malaria present signs and symptoms of disorganized action of the heart. The author speaks highly of sugar in this variety of cardiac disability. Demerara sugar, or at least some form of cane sugar, is best, and seems to have a distinctly specific effect on the myocardium. Beet sugar is not so desirable. The sugar is given in two doses, generally between buttered bread or dissolved in milk or cocoa. The patients get 4 ounces daily. Not only do the patients, who are mostly thin, gain weight, but their respiration, pulse, temperature, and blood pressure rapidly assume normal figures.

**Sulphurous Anhydride for Gonorrhoea.** The treatment of gonorrhoea and urethritis by means of nascent sulphurous anhydride ( $\text{SO}_2$ ) is described by M. Lacombe (*Union Pharm.*, 1918, 59, 56), who effects this by means of injections of picric acid and sodium thiosulphate. Two solutions are used: (1) containing 0.6 per cent. picric acid, and (2) containing 1.7 per cent. anhydrous sodium hyposulphite. An injection consists of 4 c.c. of solution 1 and 1 c.c. of solution 2. Sodium picrate is formed, with disengagement of  $\text{SO}_2$  gas and precipitation of sulphur. The gas penetrates the mucous membrane of the urethra and kills the gonococci rapidly.

**Thorium Sulphate for Typhoid Fever.** (*Paris méd.*, 1917, Nov. 10, p. 398.) Fenestre and Gérard discuss the action of thorium sulphate in typhoid fever. They conclude that the improvement in intestinal conditions and lowering of temperature obtained by ingestion of thorium salts prove that they have a favourable action on intestinal infections. The dose is 4 Gm. (0.4 Gm. ?) daily, given either as 2 per cent. solution or in cachets.

**"Yadil" for Cyclitis.** (*Prescriber*, 1917, 11, 179.) P. A. Harry has found in "yadil" (see *Y.B.*, 1917, 175) an antiseptic which can be given internally in cases of eye trouble such as cyclitis with good effect and without harm to the patient. The dose given was 1 teaspoonful 3 times daily. Over 15 cases were treated with this substance, and all did well.

## PHARMACOGNOSY

**Adonis vernalis Leaves, Examination of.** F. W. Heyl, M. C. Hart, and J. M. Schmidt. (*J. Amer. Chem. Soc.*, 1918, 11, 436.) The literature of the drug as reviewed shows very conflicting statements as to the nature of the very active constituents. The authors find that the commercial so-called "adonidin" is not a definite chemical entity. The 1:10 tincture prepared by them with EtOH 50 per cent. was found to be slightly more active than a similar tincture made with EtOH 95 per cent. when tested by the U.S.P. official frog method. The tincture made with stronger EtOH, however, retains its original activity much better. Adonis is found to be more potent than digitalis in the terms of the U.S.P. assay process,



Ouabain = 0.0000005 Gm. per Gm. frog.

Digitalis leaves = 0.0006 Gm. per Gm. frog.

Adonis vernalis leaves = 0.00045 Gm. per Gm. frog.

Strophanthus = 0.000006 Gm. per Gm. frog.

It would therefore appear reasonable to adopt the same standard for both these drugs; i.e., 0.006 c.c. of the tincture per gm. frog.

Experiments on the air-dried leaves, extracted with various solvents are described. No very definite results were obtained by the various processes adopted for the preparation of "adonidin." A number of crystalline and amorphous products were isolated from the EtOH extract of the leaves. Some of these have been submitted to ultimate analysis but do not appear to have been identified. Choline was extracted, and the adonitol of Merck found and identified. The presence of glucosidal constituents was established, but over 60 per cent. of the toxicity of the drug is attributed to basic constituents. Cervello's work was repeated and gave a product more toxic than commercial adonidin. This, however, was not purely glucosidal and failed to give indication of any basic constituents. An examination of the resins and fats present concludes the article which should be consulted for details. (See also *Y.B.*, 1913, 133, 295; 1916, 3; and *Gen. Index*.)

**Aletris Farinosa Root, U.S. Official Standard for.** (*Amer. J. Pharm.*, 1917, 89, 605.) The U.S. Department of Agriculture calls attention to the poor quality of the "Unicorn root," *Aletris farinosa*, at present on the market. Even when genuine, it frequently gives an excessive amount of ash. If the drug is properly collected it will not yield more than 10 per cent. of total, and 5 per cent. of insoluble ash. Any sample containing more than 16 per cent. of total ash will therefore be condemned. One sample was met with which contained only 3 per cent. of the genuine drug, the bulk consisting of *Chamaelirium luteum*, or false unicorn root. (See also *Y.B.*, 1911, 220; 1915, 225; and *Gen. Index*.)

**Belladonna, Cultivation of, in California,** A. Schneider. (*Pacif. Pharm.*, 1918, 11, 267.) The article deals with the special conditions of culture prevailing in U.S.A. Insect pests and diseases are dealt with. In conclusion a very complete review of the bibliography of the subject is given, with reference to

nearly 70 publications. (See also *Y.B.*, 1914, 185; 1915, 218.)

**Belladonna Root, *Rumex crispus* substituted for.** (*Bull. U.S. Department of Agriculture*, through *Pharm. Era*, 1918, 51, 58.) Examination of samples of importations of belladonna root, L., has disclosed that the roots of yellow dock, *Rumex crispus* L., were substituted in one instance for the true material. The roots of *Rumex crispus* are externally reddish brown, deeply longitudinally wrinkled, finely annulate above, and have a somewhat fibrous fracture, whereas those of *Atropa Belladonna* are externally pale brownish gray, show only weak longitudinal wrinkles, and have a nearly smooth fracture.

**Camphor Production in U.S.A.** (*Oil, Paint and Drug Report*, 1917, 92, (20), 22.) A commercial experiment on the cultivation of camphor trees is being conducted in Florida. At the present time 1,000 acres are planted with camphor trees, which have been producing camphor on the commercial scale for the past three years. An additional 1,000 acres has just been planted. The total number of trees will now amount to approximately a million. Hitherto the whole camphor output from this station has necessarily not been of sufficient magnitude to have an appreciable effect in meeting the enormous demand for camphor in the country. The quality of the camphor produced is fully equal to that of the imported article. A new clipping machine for cutting the twigs and leaves from the growing trees has been invented and will soon be under trial. It is hoped that this will materially reduce the labour cost of harvesting the raw material, and thereby have an important bearing on the commercial future of the enterprise. The matter is at present in a purely experimental stage, but shows a promising future. (See also *Y.B.*, 1913, 71; 1912, 77; 1911, 224; 1910, 63, 194.)

***Cannabis Indica*, American-Grown, not Distinguished from the Drug of Commerce.** E. J. Parry (*Oil, Paint, and Drug Report*, 1917, 92, (15), 56) finds that a sample of American *Cannabis indica*, grown in South Carolina with U.S. Government co-operation, is indistinguishable from the drug. This sample contained 11.5 per cent. of seeds, which is quite a fair average for a good quality *cannabis indica*. It gave 15.3 per cent. of oleoresin. This proportion is quite good, many samples of Indian hemp containing less than this, although some samples

contain rather more. (See also *Y.B.*, 1908, 229; 1913, 263; 1915, 227; 1916, 249.)

**Cannabis Indica, Deterioration of, on Storing.** C. R. Eckler and F. A. Miller. (*J. Amer. Pharm. Assoc.*, 1917, 6, 872.) In samples stored in a warm dry attic, the loss in activity was practically 100 per cent. in about 50 months. (The drug at the end of the ageing period, was, however, about 55 months old from date of harvest.) This would give an average loss in activity of about 2 per cent. per month. Apparently, however, the deterioration did not proceed so rapidly at first, for in the first period of about 14 months not more than a very slight deterioration was noticeable, while during the next period of about 21 months there was a deterioration of nearly 60 per cent. of the original activity, and during the last period of about 15 months there was apparently a loss of approximately 40 per cent. Dry samples stored in a cool basement lost in about 60 months approximately 60 per cent. of their original activity, or about 1 per cent. each month on the average. (This drug at the end of the ageing period was about 65 months old from date of harvest.) These results, in connexion with those of the preceding paragraph, would seem to suggest that the warmer temperature of the attic was influential in increasing the rate of deterioration. Drug stored in sealed containers in a dry state did not retain its activity appreciably longer than when stored in unsealed containers, nor did it retain its activity appreciably longer when stored whole than when granulated. Granulated drug sealed in a tight barrel and well moistened with alcohol seemed to retain its full activity for at least 60 months.

**Castalea Nicholsoni, Histology of.** C. J. Zufall. (*J. Amer. Pharm. Assoc.*, 1918, 7, 166.) The drug, under the name of "Chaparra amargosa" and "Goat bush" is used in Mexico and Antigua as a remedy for amoebic dysentery, for which it is reported to be very efficient. The histological characters of the stem, root and leaf, and of the powdered drug, are described and illustrated.

**Chilian Medicinal Plants.** R. P. Costes. (*Bull. Soc. d'acclimat. de France*, 1918, 112, through *L'Union Pharm.*, 1918, 59, 182.) *Lithraea mollis*. This drug, known as Chilian "molle" must be distinguished from Peruvian "molle" which is *Schinus molle*. *Lithraea mollis* yields a resin on incision of the

trunk, which is used for plasters for wounds and rheumatism. The decoction of the bark is employed in nervous diseases. *Porlicra hygrometrica*, known as "guayacan," also yields a resin, which has properties similar to those of the resin of *Guaiacum officinale*. It is used as an emmenagogue, stimulant, diaphoretic and as a remedy for syphilis. *Cassia vernicosa*, known as "alcaparra," is used as a domestic medicine. The leaves are purgative but less active than senna. Another tree known as the "litre," the botanical source of which is not stated, causes painful dermatitis in susceptible individuals by contact of any parts with the skin. It is suggested that a counter-irritant as a substitute for thapsia may be prepared from it. The "litre" tree also yields a resin, and a volatile oil.

**Chondodendron platyphyllum**, a Wild Brazilian Fructiferous and Medicinal Plant. G. Peckolt. (*Bull. Agr. Intelligence* 1917, 8, 248, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 3349.) The author has identified the plant called in Brazil "Jaboticaba de cipó," "Abutua legitima," "Parreira brava," "Parreira do matto," "Uva do matto," as *Chondodendron platyphyllum*. The fruit pulp has an "acid sweet" taste resembling that of the grape. The fruits keep for a long time. They are eaten raw and various cakes are prepared from them; their juice, fermented, and with the addition of 3 to 4 per cent. sugar, makes a good wine. A dark red colouring matter is also extracted from them. The root of "Jaboticaba" has long been used as a popular medicine in Brazil, serving as a tonic, diuretic and febrifuge. These properties have been confirmed by various European scientists, but the root is still very little employed in medicine.

**Cinchona robusta**. L. van Itallie and H. J. Lemkes. (*Pharm. Weekblad*, 1917, 54, 1225-34, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 81.) *Cinchona robusta*, a hybrid of *C. officinalis* and *C. calisaya* or *C. succirubra*, has been but little used in pharmacy. It contains more cinchonidine than quinine, and is not suited for making pure quinine. But it is an excellent source for a total alkaloids which has recently come into demand for proprietary medicines. It also contains 5.5 to 27 per cent. of cinchotannic acid, which might add to its commercial value.

**Cinchona Succirubra Bark grown in Paris under Glass.** Vischniaev. (*Schweiz. Apoth. Zeit.*, 1917, 55, 713.) The bark



removed from *Cinchona succirubra* trees grown at a temperature of 16–18° C. in a greenhouse of the garden at L'Ecole supérieure de Pharmacie, at Paris, yielded 7 per cent. of total alkaloids, of which the quinine was equivalent to 2 per cent. of quinine sulphate.

**Cottonseed Meal, Micro-Detection of, in Feeding Stuffs.** J. A. E z e n d a m. (*Rijksl andbouproefstat*, 1915, 17, 89, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2003.) A weighed quantity of the finely powdered material, 0.050 Gm., is mixed with a few drops of chloral hydrate solution. Particles of cottonseed become bright green. It is claimed that by counting these and the uncoloured elements in a given area of the micro field an approximate determination of the amount of cottonseed meal present can be made. The admixture of less than 1 per cent. is detected thus.

**Digitalis, Deterioration of, on Keeping.** H. C. H a m i l t o n (*J. Amer. Pharm. Assoc.*, 1918, 7, 433.) After reviewing the work of other investigators the author thus summarizes the results of his own experiments:—

The degree of deterioration of the tincture varies with different lots. The fat-free tincture made with 70 per cent. EtOH is apparently less subject to deterioration than that from the original drug. The deterioration of tincture of digitalis is not so uniformly rapid as isolated experiments would indicate. (See also *Y.B.*, 1911, 227, 243; 1912, 442; 1913, 266; 1914, 208; 1915, 231, 266; 1916, 266, 347.)

**Digitalis Leaves, Method of Cleansing and Suggestions for Preparation and Storage for Pharmaceutical Use.** C. H. R o g e r s and E. L. N e w c o m b e. (*Amer. J. Pharm.*, 1918, 90, 238.) Commercial digitalis often contains much adherent inorganic matter. Experiments on drying and cleaning the leaves in considerable quantity conducted in the laboratories of the College of Pharmacy in Minnesota University are detailed. The adhering soil and dirt is easily removed by sifting the leaves in a gyrator sifter, first through a coarse 14 mesh, and then these coarse siftings which contained particles of leaves, through a 50 silk mesh. The fine powder thus obtained was found to consist mainly of inorganic matter and the hairs of the leaves. It gave 56 to 57 per cent. of ash, and no digitoxin reaction. It is suggested that official digitalis should be submitted to

some such simple cleansing process and specially before being ground to powder.

The U.S.P. requirement that digitalis for infusion be bruised does not ensure uniformity in degree of fineness of drug, which different pharmacists use in making infusions. It would be advisable if the U.S.P. formula directed the use of digitalis in number 6 powder for the same. A mechanical process may be employed to reduce the drug to a uniform number 6 powder. The petioles are deficient in digitoxin, appear to contain much mucilaginous material and may largely be separated in producing a uniform number 6 powder. Gelatin capsules afford an excellent means for packing digitalis to be used in making infusions. The total percentage ash of clean petioles of digitalis is approximately the same as the clean lamina portions. Mn appears to be a constant constituent of digitalis leaves but varies in amount in samples obtained from different sources. Siliceous foreign matter insoluble in HCl may be almost entirely separated by a cleaning process. Digitalis produced in Minnesota normally contains Fe, Ca, Mg, Mn, K and Na.

The total ash of leaves from cultivated plants usually averages higher than the ash of leaves from wild-growing plants.

**Drug Conservation during Wartime.** A. Hunsberger. (*J. Amer. Pharm. Assoc.*, 1918, 7, 349.) The question of saving valuable drugs and flavouring agents by careful prescribing is practically discussed. The use of elixirs and similar complex sweetened alcoholic preparations in wartime is condemned. The majority of salts may be satisfactorily dispensed in aromatic waters. Alkaloids and potent drugs should be prescribed in the form of pills, capsules, wafers, tablets and powders. Vegetable drugs may be given as infusions.

As a concrete example of the potentialities of the conservation plan proposed, elixir terpin hydrate serves well. Only one 4-ounce prescription for this preparation dispensed in each drug store in the U.S. consumes between 550 and 630 gallons of alcohol, more than 3 tons of glycerin, and about 1 ton of syrup. If the active ingredient of the preparation, terpin hydrate, is administered in powder, pill, or capsule form, these are saved.

**Drug Cultivation, Experimental, in Wisconsin.** (*Oil, Paint and Drug Report*, 1917, 92, (24), 23.) The report of the Pharmaceutical Experiment Station of the University of Wisconsin

on the cultivation of drug plants during the past season shows that several acres were planted and that the year's harvest includes an acre of belladonna, a half acre of hyoscyamus, an acre of peppermint, a half acre of wormwood and a half acre of digitalis. Among the plants that have been transplanted in the new gardens are *Iris germanica*, *I. pallida*, *I. versicolor*, and *Acorus calamus*. Preparations are also being made for the cultivation of *Monarda punctata* and *M. fistulosa*, both of which are native wild medicinal plants, and also include mayapple and male fern.

**Euonymus atropurpureus Bark, Presence of Foreign Admixture in.** E. M. Holmes. (*Pharm. J.*, 1918, (4), 46, 88.)

A suspected parcel of euonymus bark was found to consist of two distinct barks. The mixed bark consisted of approximately one of the genuine drug and seven parts of the substitute. For genuine euonymus bark, the most distinctive characters are the longitudinally striated cork, and a tangentially striated liber, best seen under a lens after wetting the surface of a transverse section, and the presence of delicate threads when a piece is gently broken transversely and observed under a lens. The microscopical structure shows numerous medullary rays which are very narrow, consisting of a single row of radially elongated parenchyma, the surrounding cells being elongated tangentially. The spurious bark is slightly thicker, and distinctly marked with numerous transverse ridges. The colour was exactly similar to that of the true bark. The medullary rays were quite distinctive, consisting of about three rows of cells more distant than those of euonymus bark, and besides these, large oval cells are present, five or six times the size of the rest of the parenchyma. These contain a yellowish secretion. The false bark has not at present been identified.

**Euonymus atropurpureus Bark, Adulterated.** — Guérin. (*Répertoire*, 1918, 29, 90.) Attention is called to the adulteration of euonymus bark with the bark of an American rutaceous plant, *Ptelea trifoliata*. The properties of this bark are quite different from those of the genuine drug. Its appearance and structure are also quite distinct. It is thicker than euonymus bark and has a peculiarly rancid odour.

**Euonymus Bark, Wafer Ash Bark as Adulterant of.** H. W. Youngken. (*Amer. J. Pharm.*, 1918, 91, 160.) Recently

the author has met with one parcel of so-called Wahoo bark which consisted entirely of wafer ash bark, and three other parcels consisting of mixtures of the two barks in varying proportions. Wafer ash bark is derived from *Ptelea trifoliata*, a small Rutaceous tree occurring in the U.S. from Lake Ontario to N. Florida and westward to Minnesota and Colorado. The bark appears on the market in the form of irregular transversely curved pieces or in quills of variable size and 3 to 4 mm. thick. Its outer surface is light brown with prominent broad irregular transverse, greyish-white lenticels and transverse ridges. Its inner surface is brownish-yellow and smooth. Its fracture is short, the broken surfaces appearing waxy and pale yellow. The odour is faint and the taste bitter and acrid. Euonymus (Wahoo) Bark occurs in transversely curved pieces or single quills of variable size and 1 to 2.5 mm. thick. Its outer surface is greying to greyish-brown, irregularly furrowed and ridged and showing occasional transverse lenticels. Its inner surface is light brown or light buff. Its fracture is short, exhibiting silky projecting caoutchouc threads in the inner phloem region. Its odour is characteristic and its taste bitter and acrid. The histological differences of the two barks are detailed and illustrated with photographs. The author is unable to confirm the statement in the N.F. monograph on euonymus as to the occurrence therein of typical non-lignified bast fibres. The fibres thus described were probably wood fibres present in the wood of the root, some of which frequently adheres to medicinal barks.

**Foeniculum vulgare Fruit Adulterated with *F. piperitum*.** (*Bull. U.S. Department of Agriculture*, through *Amer. J. Pharm.*, 1918, 90, 52.) Examination of samples of "fennel seed," *Foeniculum vulgare*, has disclosed that bitter fennel, *Foeniculum piperitum*, has been substituted in some instances for the true material. This species is not cultivated and may be distinguished from *Foeniculum vulgare* by its very much smaller size and the decidedly bitter taste and flavour of its volatile oil. The department will recommend the exclusion from the U.S. of any shipment labelled "fennel seed," consisting wholly or in part of bitter fennel.

***Frenela rhomboidea* is *Callitris rhomboidea*.** R. T. Baker and H. G. Smith. (*Perfum. Record*, 1918, 9, 109.) It is pointed out that the correct botanical name for the "Oyster Bay Pine" is *Callitris tasmanica* and not *Frenela*. Oyster Bay



is in Tasmania. The oil reported on by Singh was derived from the allied species *C. rhomboidea*, which is restricted to the eastern portion of N.S. Wales, and is not therefore the "Oyster Bay Pine." The authors point out that *C. tasmanica* is an infinitely superior source of oil for perfumery purposes to *C. rhomboidea*. It yields six times as much, and the content of geranyl acetate is more than double. It is unfortunate from an economic point of view that the trees introduced into India were not those of the true "Oyster Bay Pine," *C. tasmanica*.

**Hedeoma pulegioides Leaves, Inferior Quality of Commercial.** (*J. Amer. Med. Assoc.*, 1918, **70**, 993.) The Food and Drugs Bureau of the U.S. Department of Agriculture states that in a large number of instances samples of commercial American pennyroyal leaves contain an undue amount of stems, much sand, and foreign material. It is evident that the drug is often carelessly gathered. It is proposed to rule that the drug shall not contain more than 10 per cent. of stems, not more than 16 per cent. of total ash; and not more than 6 per cent. of ash insoluble in acid (sand). Samples exceeding these limits will be held to be adulterated. Before these figures are finally adopted, the opinion of interested persons as to the fairness of the ruling is asked.

**Helonias, Pharmacognosy of.** J. Moser. (*Amer. J. Pharm.*, 1917, **89**, 291.) The dried rhizome and roots of *Chamaelirium luteum* are extensively used in domestic medicine in U.S.A. The drug has many synonyms: Helonias, devil's bit, blazing star, drooping starwort, unicorn plant, false unicorn root, and colic root. It has not been properly investigated chemically.

The drug consists of an annulate rhizome of upright or oblique growth, 1 to 5 cm. long, 0.5 to 1 cm. in diameter, bearing at the crown numerous leaf bases or in rhizomes of oblique growth, one or more stem scars in addition. Below there are numerous roots, often stripped of their cortical layers, and piercing the cortex of the rhizome through characteristic openings. They enter the cortex of an upright rhizome at an angle of about 45 degrees, are more numerous in the newer growth near the crown and are often decayed in the older parts of the rhizome. The lower portion of the rhizome, representing growth two or more years old, often decays and disappears, causing the rhizome to end abruptly. The colour varies from light brown to yellow-

ish ; fracture of the rhizome tough and horny : odour slight ; taste bitter.

A number of photographs of the macro- and micro-characters are reproduced. (See also *Y.B.*, 1915, 225, and *Gen. Index*.)

**Hydrastis Powder, Micro-Identification of.** O. E s s. (*Schweiz. Apoth. Zeit.*, 1918, 56, 105.) The reaction depends on the formation of characteristic crystals of berberine nitrate by the action of  $\text{HNO}_3$ . This salt is sparingly soluble in EtOH. The powdered material is moistened on the slide with a drop of EtOH, and then with two drops of 30 per cent.  $\text{HNO}_3$ . In a short time bundles of bright yellow needles of berberine nitrate will be seen. On warming, these disappear and the powder becomes brownish-red in colour. (See also *Y.B.*, 1912, 203 ; 1914, 147).

**Hygrophila Salicifolia Seeds.** A. L e n d n e r. (*Schweiz. Apoth. Zeit.*, 1918, 56, 127.) The seeds of this acanthaceous plant are known in Java as telur kodok, "frog spawn." They are small discoid round or oval reniform brown seeds covered by adpressed hairs. On contact with water, these hairs become erect and the seed coat becomes enveloped in a thick gelatinous envelope, assuming the appearance suggested by the native name. The seeds contain 25 per cent. of oil ; traces of an unidentified alkaloid ; and a bitter principle. They are used in Java for preparing cataplasms and cold compresses. In India, the seeds of the nearly allied *Hygrophila spinosa* furnish a mucilaginous tonic and diuretic infusion. The mucilage has the characters of both cellulose and pectose.

**Insect Flowers, Cultivation of, in Japan.** (*Pharm. Era*, 1918, 51, 61.) The cultivation of the Dalmatian insect flower, *Chrysanthemum cinerariaefolium*, introduced into Japan in 1885, has now reached considerable proportions. The flowers are grown chiefly in the prefectures of Wakayama, Hiroshima, Okayama and Shizuoka, where the powder is also ground, or in Osaka. The product of the 1917 crop is stated to have been 8,000 tons. Photographs of Japanese plantations and plants are reproduced.

**Malagasy Drugs.** W e s t l i n g. (*Svensk farm. Tidskrift*, 1916, 389 ; 1917, 393, 473, through *Schweiz. Apoth. Zeit.*, 1918, 56, 165.) *Voantameneka*. Under this name the fruit of *Quisqualis madagascarensis* is used as an anthelmintic for children. It contains much fat, tannin, and an alkaloid. *Vaky* is the root

*Landolphia Perrieri* of the N.O. Apocynaceae. It resembles sarsaparilla in odour, and is employed in a similar manner, as a decoction, for syphilis. It contains no alkaloid, but much starch and some glucosidal constituent. *Voafotsy* is the native name for the dried leaves of *Neumannia (Aphloia) theaformis*, N.O. Flacourtiaceae. It is used for a number of diseases by the natives. It contains resin, tannin, hesperidin, and another glucosidal substance, but no alkaloid. *Hanidraisoa* is the leaves and stems of *Senecio janyasioides*. It is used for syphilis and for an intestinal disease known as "tambavy." It contains inulin and an alkaloid probably allied to senicine. A non-alkaloidal crystalline substance is also present, which can be sublimed, and which crystallizes from water and Et<sub>2</sub>O in rhombic tablets and from acetic ether in needles.

**Matico substituted by Eupatorium glutinosum.** C. O. Ewing and J. F. Clevenger. (*J. Amer. Pharm. Assoc.*, 1918, **7**, 511.) A parcel imported as matico (*Piper angustifolium*) was found to consist of the composite *Eupatorium glutinosum*. This plant is indigenous to the same localities as matico, and is referred to as "Peruvian matico." The spurious drug has a superficial resemblance to true matico, but the leaves are opposite; have serrate margins and a cordate base and the lamina is shorter and narrower. The under surface is less prominently reticulated. The false drug contains a very small amount of essential oil.

**Opium, Macedonian.** — Brunetti. (*Bull. Sci. Pharm.*, 1918, through *Répertoire*, 1918, **29**, 162.) Opium is grown in a number of districts in Serbian Macedonia. Of these that produced in Kavodar, Négotine, Vélés and Chtip holds the foremost place. This generally contains 15 per cent. of morphine calculated on the dry opium. Opium from other Macedonian districts averages about 12 per cent. of morphine. Macedonian opium arrives on the market in balls or conical cakes weighing from 450 to 900 Gm., or in small flat cakes of 180 to 300 Gm. entirely covered with poppy leaves. In the pure natural state it is a light pale paste, free from fragments of the capsules. When moist it may be cut with a knife, showing a dark brown or blackish section, sometimes homogeneous: sometimes finely mottled with lighter veins; the section is unctuous to the touch. When hard it has a granular fracture. The odour is characteristic and not unpleasant. Macedonian opium resembles that

of Smyrna in its richness in morphine. It contains more codeine than Asia Minor opium.

**Podophyllum peltatum Rhizome, Season for Collecting.** G. A. Russell. (*Amer. J. Pharm.*, 1918, **90**, 9.) The gathering of podophyllum rhizome is conducted at all seasons, without regard to the subsequent quality of the drug. The author has systematically examined the rhizome during the whole growing period and finds considerable seasonal variation differences in the proportion of its mean constituents. Six samples of *Podophyllum peltatum* were collected in Wisconsin, from the same type of soil, during the growing season of 1916. These samples were examined in August, 1917. The moisture content of the fresh drug was greatest at the height of the growing season and least after the plant became dormant in the autumn. The ash content of mixed rhizome and roots was found to be in excess of that specified by the United States Pharmacopoeia, IX. The greatest percentage of resin was found in the early spring-collected drug, and this resin conforms closely to the Pharmacopoeial requirements. The spring-collected drug, gathered just as the plants began to show above ground, and the late autumn-collected drug are both worthy of consideration. The spring-collected drug yields high in resin which conforms more closely to the requirements than does the autumn-collected drug. The latter calculated on the basis of fresh material will yield more resin since the rhizome and roots contain less water than the spring-collected drug. To secure the maximum amount of resin the rhizome and roots of *Podophyllum peltatum* should be collected in the autumn after the aerial part of the plant has died down. If spring collection is attempted it should be done before the plant begins to send out aerial shoots. Later than this the resin decreases and the moisture content of the rhizome and roots increases.

**Rhubarb, Chinese, Inclusions in the Rhizome of.** O. Tunmann. (*Ber. botan. Ges.*, 1917, **35**, 191-203, through *J. Amer. Chem. Soc.*, 1918, **12**, 925.) Rhizomes of Chinese rhubarb frequently contain large, tumour-like growths, imbedded in the normal tissue but completely separated by a layer of cork. One such growth was almost 5 cm. long and contained within itself a similar growth likewise bounded by cork tissue. The growth consists of complex tissues, are practically free from starch, uncombined sugars and glucosides, but are rich in oxal-



ate druses, the oxalate cells being abnormally numerous. The woody fibres contain the usual amount of catechol and gallic acid. Residues of anthraquinone glucosides—hydroxymethyl-anthraquinones—are present in large quantities, chiefly as the corresponding anthranols (reduction products), which can be separated by sublimation. On warming a section of the growth with pure  $\text{HNO}_3$  on a microscope slide, recognizable nitro compounds of the hydroxymethylantraquinones were obtained.

**Simaruba Bark of Commerce.** P. Casparis. (*Schweiz. Apoth. Zeit.*, 1918, **56**, 133.) At the present time, two distinct kinds of Simaruba bark are met with in commerce known as Maracaibo and Orinoco or Surinam Simaruba barks. The difference between the Maracaibo and Orinoco barks is so great that they cannot be derived from the same species. Orinoco and Surinam bark are, however, from the same tree, and are identified as the bark of *Simaruba officinalis* D.C. The Maracaibo bark was not known in commerce before 1904. It has since practically displaced the Orinoco or Surinam bark. The author has examined forty other barks of the N.O. *Simarubaceae* in the endeavour to trace the species, without success. It is placed, however, very near *Simaruba suffruticosa* Eng. The histological descriptions found in pharmacopoeias did not afford any definite indication as to which of the two barks might be regarded as official. The author has thoroughly investigated the histology of the various Simarouba barks, and has given descriptions, illustrated by drawings of the micro structure of a number of them.

**Solandra longiflora, A New Drug Plant.** E. N. Ward. (*Agr. Gazette N.S. Wales*, 1917, **28**, 670, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 3380.) The leaves of this plant produce solandrine which has properties similar to those of atropine.

**Taraxacum Root, American, Adulterated with Lactuca Root.** (*Bull. U.S. Department of Agriculture*, through *Amer. J. Pharm.*, 1918, **90**, 51.) Examination of samples of importations of dandelion root has disclosed that in some instances roots obtained from a *Lactuca*, very probably *Lactuca canadensis*, or *Lactuca spicata* have been substituted for the true material. The root of *Taraxacum officinale* may be distinguished by the concentrically arranged groups of laticiferous vessels and sieve tubes, which alternate with whitish inulin-bearing parenchyma. *Lac-*

*tuca* root is characterized by its tracheae which are arranged in radial rows, usually one cell wide, alternating with medullary rays two or three cells wide. The department will recommend the exclusion from the United States of any shipment labelled dandelion root, consisting wholly or in part of roots of *Lactuca* species.

**Vanilla Beans, Effect of Curing on the Aromatic Constituents of.** F. R a b a k. (*Am. Perfumer*, 1917, 12, 295; 1918, 326-7, 361-2.) The commercial process of curing vanilla beans is unnecessarily long, averaging several months in duration and is capable of improvement. The following process gave excellent results in a month or less: Beans were immersed three times in water at 80° C. at 30 seconds intervals for periods of 10 seconds, wrapped in a soft towel and sweated at room temperature for 11 or 12 days, and finally dried for about the same length of time in waxed paper. While the amount of vanillin was not appreciably greater than in commercial beans, the amount of vanilla resins and colouring matter was generally larger. The superiority of the extracts of the laboratory cured beans over those cured commercially is ascribed to the large quantity of resins in the former. If a menstruum weaker than 65 per cent. EtOH is used in preparing the extract a considerable proportion of the resins is not dissolved and an inferior preparation is obtained. It is suggested that if green beans were imported into the U.S.A. and cured there, a better product would be obtained.

**Viburnum Opulus Substitute.** (*Service and Regulatory Announcements, U.S. Dept. of Agriculture, Amer. J. Pharm.*, 1917, 89, 605.) A recent survey of the *Viburnum* barks on the market showed that while all samples of black haw, *Viburnum prunifolium*, examined proved to be genuine, in most instances the bark of mountain maple (*Acer spicatum* Lam.) has been substituted for true cramp bark (*Viburnum opulus*). A similar survey of preparations of *Viburnum opulus* L. on the market, especially of fluid extracts, indicates that most of them also were prepared from *Acer* species, very probably from *Acer spicatum*. The bark of *Acer spicatum* may be distinguished from that of *Viburnum opulus* by its fracture, which is fibrous, due to the presence of large and numerous groups of long bast fibres, while that of *Viburnum opulus* is short and weak, since it has no bast fibres, or the bast fibres, if present, are few

and scattered. The barks may, furthermore, be distinguished by the colour which develops when a drop of 1 per cent. or 0.1 per cent.  $\text{FeCl}_3$  solution is placed on the inner surface of the bark. After several minutes a blue colour develops in the case of *Acer spicatum*, while in the case of *Viburnum opulus* a green colour develops, due in both instances to the tannins present in the barks. If woody tissue is present on the inner surface of the bark, it should be removed before making the test.

The substitution in whole or in part of any *Acer* species for *Viburnum opulus* in barks or their preparations will be officially considered to be adulteration. The term "cramp bark" applies only to *Viburnum opulus*, now official in the National Formulary, and consequently should not be used for barks from other sources or their preparations. (See also *Y.B.*, 1907, 175; 1915, 225, 343; 1916, 371; and *Gen. Index*.)

**White Cummin Seed, Cyprian, and its Essential Oil.** (*Bull. Imp. Inst.* 1917, 15, 302.) The fruits of *Cuminum Cuminum*, grown in Cyprus, yielded 3.4 per cent. of bright yellow essential oil: sp.g., 0.956 at 15° C.;  $a_D + 1^\circ 30'$ ;  $n_D^{25^\circ \text{C.}}$  1.510; soluble in EtOH 80 per cent., 1:1.1; total aldehydes, 52 per cent. This oil is richer in aldehydes than the average commercial oils which give from 20 to 30 per cent.

**Xanthium Macrocarpum Leaves substituted for Stramonium.** P. Guérin. (*J. Pharm. Chim.*, 1918, 17, 102.) *Xanthium strumarium* has several times been detected by English pharmacists as an adulterant of imported stramonium leaves. The author now finds *X. macrocarpum* leaves entirely substituted for the genuine drug in several samples of Spanish origin. The upper surface of the leaf has a pale yellowish-green colour and the petioles and nervures of the leaves are distinctly rough to the touch on account of the number of short acute whitish hairs which cover them. The identity of the species was established by means of the male and female capitula found in all the samples. Details of the distinctive microscopical characters of the true and false drug are given. (See also *Y.B.*, 1917, 214.)

## PHARMACOLOGY AND THERAPEUTICS

**Absorption of Drugs and Poisons through the Vagina.** D. I. M a c h t and J. B. B r a d y. (*J. Exp. Pharm. Path.*, 1918, **10**, 509-21, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 955.) A large number of drugs and poisons, alkaloids, salts, esters and antiseptics can be and are easily absorbed through the vaginal wall. Such absorption can be demonstrated experimentally, by physical and chemical means. A review of the clinical and toxicological literature shows that poisoning through the vagina, of a grave character, is not very rare. These experiments indicate the possibility of administering drugs therapeutically for their constitutional effects, through the vaginal route ; and on the other hand emphasize the great danger of the indiscriminate use of various poisonous substances in the form of douches, and similar vaginal applications.

**Alkaloidal Tungstates, Pharmacology of Study.** B. F a n t u s. (*J. Lab. Clin. Med.*, 1917, **3**, 179-91, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 388.) Most of the alkaloidal silicotungstates are less bitter than the phosphotungstates. The phosphotungstate and silicotungstate radicals are sufficiently nontoxic to be used for the administration of alkaloids with small dosage, such as strychnine or emetine. Inasmuch as the tungstates, when taken in liberal amounts for a long time, have a toxic action, it is probably not advisable to use these combinations for the administration of quinine or other alkaloids that would be given in large doses, until further studies of the toxicity of these have been made.

**Alkaloids, Action of Certain, on the Ureter.** D. I. M a c h t. (*J. Pharmacol.*, 1917, **9**, 287, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 1985.) Hydrastine and emetine exert a papaverine-like action on the ureter, inhibiting its contractions and relaxing its tonus. Hydrastinine and cotarnine salts (stypticin and styptol) exert a morphine-like action on the ureter, stimulating its contractions and increasing its tonus. Piperidine hydrochloride, arecoline and conine produce a stimulation of the ureteral contractions and an increase in the tone. From this and previous work, it is suggested that the inhibitory action of the papaverine group of opium alkaloids on the ureter is due to their



benzyl constituent, and the stimulating action of the morphine groups is due to the piperidine group.

**Alypine, Eucaine, Holocaine, Novocaine and Stovaine, Action of on Bladder.** J. A. Waddell. (*J. Pharmacol.*, 1917, 10, 243, through *J. Amer. Med. Assoc.*, 1917, 69, 1738.) Alypine,  $\alpha$ - and  $\beta$ -eucaine, holocaine, novocaine and stovaine stimulate the excised bladder when suspended in oxygenated Tyrode's solution at body temperature. Compared with cocaine, the stimulating action of  $\beta$ -eucaine is approximately one-seventh; of novocaine, one-sixth; of alypine,  $\alpha$ -eucaine and stovaine one-third, and of holocaine, two-thirds. Mixtures of the synthetic cocaine substitutes with each other give simple summation on the excised bladder. Combinations with epinephrine exhibit simple antagonism; and with pituitary extract simple summation on the excised bladder. Paralysis of the parasympathetic myoneural junctions by atropine does not alter the response of the excised bladder to any of the drugs of this series. The conclusion drawn is that these drugs act on the muscle directly, since their effects are the opposite to those of sympathetic stimulation and are unchanged by paralysis of the parasympathetic myoneural junctions.

**Anaesthetics, Local, Comparative Efficiency of.** T. Sollmann. (*J. Amer. Med. Assoc.*, 1918, 70, 216.) For the anaesthesia of mucous membranes, cocaine,  $\beta$ -eucaine, alypine and tropacocaine are the most useful; quinine-urea hydrochloride is fairly active. Apophesine, novocaine and potassium chloride are relatively inefficient. Alkalization increases the efficiency from two to four times. The solutions of the anaesthetic salts may therefore be mixed with an equal volume of 0.5 per cent.  $\text{NaHCO}_3$ , without loss of efficiency, and with a saving of one half of the anaesthetic. The mixtures, however, do not keep well, and should be recently made. The addition of epinephrine does not increase the efficiency, and is probably useless.

For infiltration and injection anaesthesia, cocaine, novocaine, tropacocaine and alypine are about equally efficient:  $\beta$ -eucaine and quinine-urea hydrochloride are intermediate; apophesine and  $\text{K}_2\text{SO}_4$  or  $\text{KCl}$  are relatively efficient. The efficiency is not increased by alkalization. Epinephrine greatly prolongs the action, and should always be added (except to tropacocaine). The anaesthetic action of  $\text{H}_2\text{SO}_4$  or  $\text{KCl}$  is not

great enough to be of real value. A 1 per cent. (that is, isotonic solution) would be equivalent to about 0.125 per cent. of cocaine or novocaine. However, it may well be used in place of NaCl for making anaesthetic solutions, as suggested by Braun. Several of the synthetic anaesthetics can completely take the place of cocaine. In view of this fact, it would be feasible to prohibit entirely the importation, manufacture, sale and use of the habit forming cocaine except for scientific purposes.

#### **Anaesthetics, Volatile, Toxic Factors of the Commonly Used.**

E. A. G r a h a m. (*J. Amer. Med. Assoc.*, 1917, **69**, 1666.) The common anaesthetics yield toxic products indirectly by the formation of various asphyxial acids and by favouring the formation and accumulation of many toxic products of metabolism other than acids. Certain anaesthetics, notably those which belong to the group of alkylhalids, in addition, are capable of yielding strong mineral acids in the tissues as dissociation products. For example,  $\text{CHCl}_3$  is broken down in such a way as to yield HCl in the body. The common anaesthetics are capable of dissociating in a manner which yields bivalent, or unsaturated, carbon. The toxicity of the cyanides and CO probably depends largely on their property of dissociating in a similar manner. It is therefore probable that some of the effects of the anaesthetic substances are due to their unsaturated residues.

**Antimony, The Chemotherapeutics of.** M. T s u z u k i. (*Schweiz. Chem. Zeit.*, 1918, **2**, 17, 36, through *J. Soc., Chem. Ind.*, 1918, **37**, 283A.) Just as quinquivalent As compounds, though far less poisonous than the trivalent derivatives, are without therapeutic value, so quinquivalent Sb compounds have been found to be similarly inert; in fact a biological method has been proposed for determining the valency of Sb in its compounds in this way, although a few exceptions to the rule exist. An outstanding difference between the trivalent compounds of Sb and As lies in the observation that with Sb no immunity due to acclimatization is acquired, either by the blood parasites or by the animal organism, whereas in the case of As immunity towards increasing doses is a characteristic property. The toxicological properties of Sb are very similar to those of As; as a rule, Sb compounds which are insoluble in water have slight or no toxic properties. Ranken has shown that the intravenous injection of Sb kills all trypanosomes

circulating in the blood within 20 minutes. At the same time a considerable percentage of the leucocytes are also destroyed, but a stimulus is set up which leads temporarily to an overproduction of leucocytes until equilibrium is again established. The therapeutic properties of corresponding derivatives of Sb and As show no parallelism either in character or degree. Many Sb compounds show a specific difference in their action on trypanosomes and spirochaetes, being decidedly more active towards the former. Such pronounced selective activity is not found among As compounds. Observations made on As compounds with regard to the influence of the constitution of the organic portion of the molecule on therapeutic or toxic properties are not valid for the corresponding Sb compounds. Arsacetin is very slightly active but the corresponding antimonooacetin (stibacetin) is strongly active; salvarsan is very strongly active but "antimony salvarsan" is quite inactive. These differences in the relation between constitution and activity of similar compounds may be due to the greater ease with which Sb is split off from its organic derivatives, so that the specific properties are more readily lost in the organism. For the same reason it is more difficult to suppress the poisonous properties of Sb by organic combination. The organic derivatives of Bi are still less stable. On the other hand, the complex salts of metals of the As group increase in stability with the atomic weight of the metal, and in this direction new valuable therapeutic agents may be looked for. Certain combinations of As and Sb derivatives have shown useful therapeutic results.

**Antineuritic Properties of Infusorial Earth Extract of Hydrolyzed Extract of Rice Polishings.** H. C. Brill. (*Philippine J. Science*, 1917, 12, 199.) The adsorption method of Lloyd, using infusorial earth in an attempt to isolate the vitamins from hydrolyzed rice polishings extract, failed to yield a satisfactory product. Only a part of the vitamine content of the extract was extracted by the proportions of infusorial earth used. There appears to be a loss of antineuritic power in the extract as it ages. (See also *Y.B.*, 1916, 1.)

**Antiseptics, The Solvent Action of, on Necrotic Tissue.** H. D. Taylor and J. Harold Austin. (*J. Exp. Med.*, 1918, 27, 155, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 390.) Dakin's NaOCl solution has the power of dissolving necrotic tissue, pus, and plasma clot in the concentration and reaction

used clinically. Chloramine-T and dichloramine-T do not exhibit this solvent action. The solvent action of Dakin's solution of the degree of alkalinity used clinically is due primarily to its NaOCl content, but its slight alkalinity, while in itself without solvent action, enhances the effectiveness of the NaOCl. This solvent action of NaOCl is absent below about 0.2 NaOCl concentration. The NaOCl concentration at which the solvent action ceases is lower the more alkaline the solution, and *vice versa*. None of the antiseptics studied had demonstrable action on blood clot.

**Apidol and Providol, Mercuriated Phenols, Disinfecting Power of.** W. Schrauth and W. Schoeller. (*Z. hyg. Infektkrankh.*, 1916, **82**, 279, through *J. Chem. Soc.*, 1917, **112**, I, 241.) The substances were prepared by treating the phenol with  $\text{Hg}(\text{OAc})_2$  in EtOH solution; the recrystalline products were dissolved in the calculated quantity of NaOH and diluted with water to the required Hg content. Among the preparations, Na *o*-chlorohydroxymercuriphenoxide (*apidol*) and Na dihydroxymercuriphenoxide (*providol*) have been found particularly active. Their practical importance is increased by the fact that their disinfecting power, in contrast to that of all previously investigated Hg compounds is not diminished in the presence of soap, and that they are permanently unchanged in soaps which consist chiefly of the Na salts of saturated fatty acids. Medical soaps of apidol and providol keep well.

**Arsenoschizomycetes.** V. Puntoni. (*Ann. d'ig. Roma*, 1917, **27**, 293, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 590.) Persons taking arsenical compounds such as Na cacodylate, by ingestion, exhale a penetrating odour resembling garlic. These arsenical gases are due to decomposition of the arsenical salts by bacteria, and are not the result of a cellular or diastasic action. The principal organisms in the intestinal tract capable of doing this are spore-formers belonging to three groups: (1) *B. mesentericus vulgatus*; (2) *B. mesentericus ruber*; (3) *B. subtilis*. The growth of these organisms in bouillon to which has been added salts of As is only inhibited when the concentration of the salts is very high. Na cacodylate inhibits at a concentration of 1 to 5, while Na arsenate inhibits at 1 to 20, whereas spore-formation is influenced at a concentration of 1 to 500 and 1 to 100, respectively. The exact chemical nature of the arsenical gases produced by these organisms has



not been ascertained, but they are probably not reduction products but specific compounds analogous to those produced by moulds. (See also *Y.B.*, 1904, 28 ; 1915, 121.)

**Atropine Test for Typhoid.** E. H. MASON. (*Archives Internat. Med.*, 1918, 21, 1, through *J. Amer. Med. Assoc.*, 1918, 70, 343.) Atropine was used in the diagnosis of the enteric group of infections on 109 patients, 63 of them suffering from typhoid, or paratyphoid B infections, and 46 nontyphoid cases. The method adopted was practically the same as that recommended by Marris, except that in most of the tests the author used  $\frac{1}{30}$  in place of  $\frac{1}{33}$  grain of atropine sulphate. Of the 63 cases of typhoid or paratyphoid B infections, 56 were cases of typhoid, the diagnosis being confirmed by blood culture, or by a Widal reaction in dilution above 1 in 40. Five of the remaining 7 cases were infections due to *B. paratyphosus* B, while the remaining 2 ran a typical typhoid course, but at no time was the author able to confirm his diagnosis by bacteriological or by serological methods. It seems that the reaction becomes positive at about the tenth and disappears at about the thirty-first days of disease. In the nontyphoid group 3 cases gave a positive reaction. In the diagnosis of fevers of the enteric group, the test is of great value, and in many cases undoubtedly precedes the Widal reaction.

**Atropine Test for Typhoid Unreliable.** A. FRIEDLANDER and C. P. MCCORD. (*J. Amer. Med. Assoc.*, 1918, 70, 1435.) A series of 170 nontyphoid patients has been tested with the atropine reaction by the method described as reliable for establishing the presence or absence of typhoid or paratyphoid infections. Thirty-six per cent. of the number examined yielded results characteristic of typhoid. Those cases giving reactions typical of typhoid without any evidence of typhoid existence were distributed over thirteen diseases. It is concluded from so high a percentage of discrepancies that the atropine reaction is without especial value in the detection of typhoid infection.

**Benzyl Alcohol as a Local Anaesthetic.** D. I. MACHT. (*J. Pharmacol.*, 1918, 11, 263, through *J. Amer. Med. Assoc.*, 1918, 70, 1893.) Experimental data and clinical cases show that benzyl alcohol is an efficient local anaesthetic when administered in aqueous solution. This alcohol is soluble up to 4 per cent. in water, and in physiological saline. These concentrations appear

to be entirely efficient for practical purposes. The interesting features in connexion with this drug which should be especially emphasized are in the first place its low toxicity as compared with that of the commonly employed local anaesthetic alkaloids of which cocaine is the standard representative. The next interesting and important feature in connexion with benzyl alcohol as an anaesthetic is the ability of the organism to metabolize it and excrete it in an innocuous form. Third, an important feature of this local anaesthetic is its high boiling point and the consequent ease of sterilization. Last, the comparatively low price of the drug and its ease of production.

**Burdock Extract, Stabilized, for Furunculosis.** R. Burnier. (*L'Union Pharm.*, 1918, **59**, 178.) When burdock root, from *Lappa officinalis*, is dried in the ordinary way, it entirely loses its therapeutic activity. If, however, the fresh root is stabilized by means of boiling EtOH and then dried, its enzymes are destroyed, and the drug has a remarkable efficacy in the treatment of boils. The most convenient form of administration is the soft extract of this stabilized root, which is given in doses of 10 grains (two 5 grain pills) 3 times daily. A number of cases are cited in which this treatment has proved most satisfactory.

**Castor Oil Dressing for Wounds.** J. Wishart. (*B.M.J.*, 1918, **1**, 497.) The following method of dressing wounds is recommended: Castor oil 2 ounces, anaesthetic ether 2 ounces, liq. iodi fort. 1 drachm is applied, followed by lint soaked in castor oil. The wounds done in this way only require dressing once weekly, and there is no sticking. In circumcision wounds, and ordinary incised and contused wounds, the redressing causes no pain.

**Chaulmoogra Oil as a Specific for Leprosy.** H. C. Brill and R. R. Williamson. (*Philippine J. Sci.*, 1917, **12**, 207.) Experiments have been made with various specimens of crude and refined chaulmoogra oil, and with various fractions of the oil. No very definite results have been hitherto obtained. The preference given by some practitioners for the crude oil points to the possibility that the small amount of cyanogenetic glucoside shown by Power to be present in these oils may possibly have a beneficial action. Incidentally, experiments made with amygdalin in cases of leprosy demonstrated that this glucos-

ide is without any action. The medicinal administration of chaulmoogra oil should be accompanied by the chemical control of the samples used. It seems plausible to think that the slowness of the changes caused by the use of chaulmoogra oil in the treatment of leprosy may be due to the small quantity of the active constituent present in the oil. If this constituent could be isolated and administered in concentrated form, more rapid cures should result, and the treatment would undoubtedly be less painful.

The results of Rogers with the free acids and the sodium salts make the use of these appear as promising remedies. But Rogers cautions against the assumption of a too optimistic attitude, as he regards the problem as still unsolved. On the other hand, it seems likely that antileprol and the neutral oil should be more effective than they have been found to be, if cures result from the use of the free acids and of the sodium salts. Consequently the inactivity of antileprol and of many of the commercial chaulmoogra oils should make practitioners cautious about accepting a remedy as specific for leprosy until it is proved to be such. The constants of ten samples of chaulmoogra oil are given in the article, and a chemical examination of chaulmoogra oil is included.

**Chaulmoogra Oil for Leprosy.** L. Rogers. (*Ind. J. Med. Research*, through *Lancet*, 1918, 194, 662.) Intravenous injections of the sodium salts of the fatty acids of chaulmoogra oil produce reaction in leprous tissues, with breaking down of the acid-fast bacilli, followed by great improvement in the patient's condition. In 50 per cent. of the cases treated within three years of the onset of the disease, the lesions have disappeared. The most active constituent of the oil has not yet been obtained in a pure state; so that even better results are anticipated in the near future. (See also *Y.B.*, 1917, 80.)

**Chemical Constitution and Physiological Action, Relation between.** F. L. Pym an. (*J. Chem. Soc.*, 1917, 111, 1103.) A lecture delivered before the Chemical Society, reviewing the most recent experiments on the subject and the deductions drawn therefrom. It is concluded that results hitherto obtained indicate that it is very difficult to improve upon naturally occurring active principles, the use of which in medicine is due to accumulated experience. In point of maximum effect, none of the natural alkaloids—hyoscyamine, cocaine, adrenaline,

quinine, emetine—is surpassed by its derivatives ; but, on the other hand, it has been possible in some of the cases to prepare derivatives or synthetic analogues which have proved to be of service in medicine. The original lecture should be consulted.

**Chenopodium Oil, Constituent of, Causing Gastrointestinal Irritation.** M. C. Hall and H. C. Hamilton. (*J. Pharmacol*, 1918, 11, 231, through *J. Amer. Med. Assoc.*, 1918, 70, 1893.) The experiments made by Hall and Hamilton appear to warrant the conclusion that oil of chenopodium as ordinarily marketed is a very potent and valuable anthelmintic, but that it not infrequently acts as a gastro-intestinal irritant, a fact that seems to have been commonly overlooked, disregarded, or allowed to go unstated. The gastro-intestinal irritation seems to be due to constituents making up a fourth, or less, of the volume of the oil. The use of the lighter fraction as an anthelmintic in preference to the entire oil, in order to protect the patient from gastro-intestinal irritation, is apparently indicated.

**Chenopodium Oil for Hookworm Disease.** S. T. Darling, M. A. Barber, and H. P. Backer. (*J. Amer. Med. Assoc.* 1918, 70, 499.) It would appear from a series of comparative experiments that the half maximum dose (0.5 c.c. 3 times, or 1.5 c.c. in all) of oil of chenopodium is the treatment for recommendation as a routine vermicide. It does not have the toxic effects of the full dose, and two treatments have the very satisfactory result of removing 99 per cent. of all worms present. It proved to be more effective than thymol for the same purpose. The oil appears to be equally effective in removing the two species of worms, *Ankylostoma duodenale* and *Necator americanus*, which cause the disease in U.S.A. The latter worm is said always to be encountered in the Southern States. Among Oriental immigrants *A. duodenale* forms 90 per cent. of the parasites found. The results of a great number of experiments are fully tabulated. (See also *Y.B.*, 1908, 45 ; 1915, 204 ; 1916, 277, 278 ; 1917, 179.)

**Chenopodium Oil, Pharmacology of.** W. Salant. *J. Amer. Med. Assoc.*, 1917, 69, 3016.) The undoubted value of the essential oil of American wormseed as an anthelmintic has led to its greatly extended use. It is now the chief remedy for ankylostomiasis. Its activity, however, is not confined to the organisms against which it is directed. Its toxicity to



the human and animal host has been clearly demonstrated. It is poisonous to animals in relatively small doses : and a dose which has had no toxic effect when first administered has had fatal results on animals when repeated after a few days. Fasting or poorly nourished animals are more susceptible than those which are vigorous and full-fed. Resistance is notably increased by giving a diet rich in carbohydrates for several days before the oil is administered. It is evident from published data that the drug is very active. Levy has reported 12 cases of poisoning in human patients, 9 of which were fatal. It should therefore be administered with caution. It affects the central nervous system, the heart, respiration, digestive organs and kidneys. In presence of renal or cardiac disorders it should be given in small doses only. In advanced disorders of these organs, it is contra-indicated absolutely. If toxic symptoms supervene stomach lavage should be promptly resorted to since the oil is not so rapidly absorbed by that viscus, but is very quickly taken up by the duodenum. No chemical antidote is at present known so that treatment of poisoning must be symptomatic. Experiments on the isolated heart suggest digitalis and epinephrine as excellent antagonists. Caffeine appears to be contra-indicated since it increased the toxicity of oil on the heart. While oil of chenopodium may be regarded as a safe remedy for patients in good physical condition, it should be used very cautiously in poorly nourished and weak or neurotic individuals. A diet containing a liberal amount of fats and carbohydrates, fed at least for several days before the treatment is instituted, may render the drug much safer. The routine administration of large doses of castor oil before and soon after oil of chenopodium may prove to be of prophylactic value.

**Corpus Luteum Extracts, The Influence of on the Plain Muscle.**  
M. I t a g a k i. (*Quart. J. Exp. Physiol.*, 1917, **11**, 1, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 823.) Extracts of corpus luteum generally produce a distinct increase of tone in the surviving uterus of the rat, rabbit, cat, dog and guinea pig. Rarely, however, the opposite effect is produced. These principles can sometimes be separated by EtOH, the inhibitory material going into solution. The chalone substance, which is soluble in water, is very small in amount. The hormonal substance, on the other hand, which is generally much larger in amount, is not soluble in EtOH nor in  $\text{CHCl}_3$  or  $\text{Et}_2\text{O}$ , but is

soluble in  $H_2O$ . The corpus luteum extract generally produces relaxation of the muscular tissue of the intestine and of the bladder of the rat, but contraction of the whole intestinal tube of the rabbit and kitten, although isolated strips of either the longitudinal or circular intestinal muscle of these animals shows relaxation. Urinary secretion is not appreciably affected, and venous injection of the extract produces little effect upon the blood pressure; if anything, there is a slight fall. A free secretion of milk is caused from the cut nipple of a lactating animal.

**Corrosive Sublimate Poisoning, Alleged Value of CaS in.** C. C. Haskell and R. H. Courtney. (*J. Lab. Clin. Med.*, 1917, **3**, 110-4, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **12**, 388.) The value of intravenous injections of solutions of CaS in the treatment of poisoning by  $HgCl_2$  depends chiefly or entirely on the fluid which is introduced. Results fully as good can be secured by the intravenous injection of physiological salt solution. The intravenous injection of CaS is a procedure fraught with actual danger and it is possible that death may be hastened rather than retarded by the administration of CaS. (See also *Y.B.*, 1915, 231, 239; 1917, 219.)

**Diamino-acridine Sulphate, Bactericidal Properties Conferred on the Blood by Intravenous Injections of.** C. H. Browning and R. Sulbransen. (*Proc. Royal Soc.*, through *Chem. News*, 1917, **116**, 279.) Whereas antiseptic compounds are in general greatly reduced in their bactericidal activity by the presence of serum it has been found that salts of 3·6-diamino-acridine, both unsubstituted and also various derivations with methyl-groups substituted in the amino-side-chains, or in the benzol-rings, or in both situations, are enhanced in their lethal action on bacteria by the presence of serum; this is also the case with the salt of 3·6-diamino-10-methyl-acridinium. Thus, in the presence of serum these acridine derivatives constitute the most powerful bactericidal agents known for pathogenic organisms such as *Staphylococcus aureus* and *B. coli*. Their action is slowly progressive, and concentrations which at first merely inhibit proliferation of bacteria ultimately prove lethal. In addition, salts of diamino-acridine and diamino-methyl acridinium (sulphate and chloride respectively) are relatively non-toxic for mammalian tissues and devoid of harmful effects on phagocytosis; hence they have been recommended for use in the local treatment of infected wounds and other accessible

infective lesions. Of these substances the sulphate of 3-6-diamino-acridine has been found specially suitable for intravenous injection on account of its low toxicity. It has also much less agglutinating action on red blood corpuscles than diamino-methyl-acridinium chloride. By means of an intravenous injection of diamino-acridine sulphate in a dose which had no harmful effect on the treated animal (rabbit), it has been possible to confer antiseptic properties on the blood, so that the serum from a specimen of blood withdrawn as late as from two to two-and-a-half hours after the treatment failed to yield a culture when inoculated from *Staphylococcus aureus* or *B. coli*. Serum obtained from the animals before treatment yielded abundant growth of both organisms when similarly inoculated. As far as known, these are the first observations in which it has been recorded that bactericidal properties for these organisms have been conferred on the blood serum *in vivo* by the administration of non-lethal doses of a substance of defined chemical constitution. These acridine compounds are also excreted in the urine and the bile. Indications are thus afforded for investigations with a view to chemo-therapeutic interference in septicæmic conditions and in infections of the kidneys and bile passages. (See also *Y.B.*, 1917, 168.)

**Dihydromorphine and Diacetyldihydromorphine (Paralaudin) as Substitutes for Morphine.** N. Rosenbaum. (*Berl. klin. Wochschr.*, 53, 590, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2699.) The HCl salt of dihydromorphine is a complete substitute for morphine, but is without the habit-forming effect. A dose of 0.015 Gm. corresponds to about 0.01 Gm. of morphine-HCl. This amount is usually well borne. Diacetyldihydromorphine can be taken internally as well as subcutaneously. Neither is it a habit-forming drug. Its action is slower than that of morphine or dihydromorphine. Its dose subcutaneously corresponds to that of morphine. (See also *Y.B.*, 1912, 24.)

**Dichloramine T (Toluene-para-sulphondichloramide) and Chlorinated Eucalyptol**, sp.g. 1.2, **Methods of Preparation for.** R. B. Krauss and E. Crede. (*J. Amer. Chem. Soc.*, 1917, 39, 2720.) *Method for Production of Dichloramine-T.*—Toluene-*p*-sulphonamide is dissolved in 10 parts of 1:10 NaOH (sp.g. 1.345) and diluted with 20 parts of water. The solution is carefully filtered to remove  $\text{Fe}_2(\text{OH})_6$ . Cl from a cylinder is then

passed into the solution until a voluminous white precipitate of toluene-*p*-sulphondichloramide is formed. This, collected on a filter, thoroughly washed twice with 5-8 parts of water and finally with enough 10 per cent. EtOH to make a thin paste. The dilute EtOH washing should be done very quickly and the substance separated with the aid of a vacuum filter. It is then dried at a temperature not exceeding 55° C., preferably in a vacuum dryer. The product has a negligible ash, a good Cl content but develops no free Cl on standing. The following characters and tests are suggested for dichloramine T suitable for surgical purposes. A white powder, or crystals, with a slight yellow tinge. M.p. 78-84° C. Soluble in cold  $\text{CHCl}_3$  with slight to no turbidity. Any opalescence should be removable by shaking with fused  $\text{CaCl}_2$ , being due to traces of moisture. Soluble in Dakin's prepared eucalyptol and in chlorinated eucalyptol, sp.g. 1.2. Ash not over 0.2 per cent. Cl content 29 to 29.54 per cent.

*Chlorinated Eucalyptol*.—In the method originally proposed by Dakin (*Y.B.*, 1917, 239) no definite amount of Cl enters into combination and the product may vary under different conditions. A more definite product having the sp.g. 1.2 is prepared as follows: Through a glass tube reaching to the bottom of a four gallon bottle containing about 10 kilos of eucalyptol, b.p. 176-177, sp.g. 0.930 at 15° C., is passed Cl from a cylinder. The process should be conducted in good daylight. During the chlorination the temperature rises and should be kept below 80° C. by regulating the Cl stream. HCl is given off and may be absorbed in alkali. When a sp.g. of 1.19 is reached the oil is chlorinated sufficiently. The oil is then washed with about 4 litres of water, then shaken thoroughly with 250 Gm. dry  $\text{Na}_2\text{CO}_3$  and allowed to settle. After carefully decanting 500 Gm. fused  $\text{CaCl}_2$  is added and the whole again shaken. On standing, preferably overnight, the oil is filtered, bottled and is then ready for use. It is a white or slightly amber-coloured oil, sp.g. 1.2, with a Cl content of about 31 per cent. Such an oil will readily dissolve 20 per cent. of Dichloramine T., which solution may keep in an amber bottle without decomposition for a month.

*Further Products of Chlorination*.—By the further chlorination of the 1.2 oil, products may be obtained having a specific gravity of 1.4 and higher. This may be carried out by chlorinating directly at 100° C., or with a solvent such as  $\text{CHCl}_3$  at its boiling



point. The oil of specific gravity 1.4 is amber coloured and of the consistence of molasses. The dichloramine is still soluble, although to a less extent. The future may find a use for this type of oil, since the increased viscosity presents an advantage in certain cases.

The chlorinated eucalyptol, sp.g. 1.2, is quite free from irritant properties. It may be applied directly to open wounds. When it is used as a vehicle for the application of Dichloramine T., the use of liquid paraffin, as a diluent, or to prevent the sticking of dressings is unnecessary.

**Dichloramine T. Preparations for Ophthalmic Use.** F. de L a p e r s o n n e. (*Presse méd.*, through *L'union pharm.*, 1918, 59, 87.) *Collyria*.—Solutions of dichloramine T. 1 : 200, 1 : 100, 1 : 50, and 1 : 25 in oil have been used. The 1 : 100 oily solution is quite painless and causes less discomfort than the first contact of a cocaine solution. The stronger solutions occasion more or less smarting but of short duration and less painful than that occasioned by a  $\text{ZnSO}_4$  lotion. A slight conjunctival reddening occurs which may last for some minutes. *Ointment*.—This is prepared with a gelose basis and made of the strengths 1 : 100 or 1 : 50. Its application is well tolerated. Dichloramine T. appears to be much less irritant to the conjunctival mucous membrane than the hypochlorites. It is an extremely powerful ocular antiseptic and is specially useful in the treatment of corneal ulcer. (See also *Y.B.*, 1917, 167, 189, 238.)

**Digitalis purpurea, Indian, Therapeutic Efficacy of.** G o r d o n S h a r p. (*Pharm. J.*, 1917, (4), 45, 108.) Tincture of the dried leaves of *Digitalis purpurea*, received from the Nilgiris, Madras, gave results with the pharmacological frog's heart test indicating that the drug was well above the ordinary standard of activity. Administered therapeutically in suitable cases, it proved to be fully as active as the tincture made from the ordinary drug. Indian grown foxglove may therefore be used with advantage, in the same manner as the homegrown drug.

**Digitalis, Physiological Standardization of.** M a r i e K r o g h. (*Ugeskrift for Læger*, 1917, (13), through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 738.) A modification of Straub's method is described by which the isolated frog heart is fed through the aorta (the valves being destroyed) with Ringer solution, to which varying percentages of digitalis or strophanthus can be added.

It is shown that the hearts of *R. esculenta* and *R. temporaria* behave quite differently. In *R. esculenta* the action of the drugs is a function of their concentration only, the heart being stopped by some definite concentration (0.00028 per cent. of crystalline strophanthin). The drugs are readily removed by washing with pure Ringer solution. In *R. temporaria* the action is a function of time also. The drugs are probably adsorbed by some substance in the heart, and are very difficult to remove by washing. The adsorption rates of strophanthin and digitalis appear to be different. For the standardization of digitalis preparations *R. esculenta* should be used. The strength of a preparation can be determined within 10 per cent. Size and seasonal condition of the animals do not seem to have any influence, and preparations containing EtOH or glycerin can readily be standardized. (See also *Y.B.*, 1913, 297; 1915, 232; 1917, 272.)

**Diphtheria Bacilli, Disinfectant Action of Quinine Derivatives on.** H. H. Schaeffer. (*Biochem. Zeitsch.*, 1917, 83, 269, through *J. Chem. Soc.*, 1918, 114, (1), 95.) Quinine shows an inhibitory action towards diphtheria bacilli in a concentration of 1 : 10,000. This action is not greater in the cases of hydrocupreine and its methyl, ethyl, and isopropyl derivatives. Isobutylcupreine is, however, more active, being antiseptic in a concentration of 1 : 50,000. Isoamyl, hexyl, heptyl, and octyl derivatives show increased antiseptic activity with increasing molecular weight, the octyl derivative being active in the concentration 1 : 750,000. The decyl derivative is less active (1 : 500,000), and from this substance onwards the activity of the derivatives progressively diminishes with increasing molecular weight until the cetyl derivative is active only in a concentration of 1 : 5000. The lethal action of the disinfectants runs for the most part parallel with their inhibitory action; an exception was found in the case of hexylhydrocupreine, which has a greater antiseptic action than its next lower homologue (isoamylhydrocupreine), but a smaller disinfecting action. The monohydrochlorides of the alkaloid were more active than the dihydrochlorides. The hydrocupreine derivatives showed good disinfecting action in human serum.

**Drugs, Local Action of, on the Human Skin.** T. Sollmann and J. D. Pilcher. (*J. Pharmacol.*, 1917, 9, 309, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 1986.) The skin

was scarified or punctured and a large series of different drugs in various forms was applied. The local reactions produced are urticaria wheals, vascular changes and smarting or pain. Among the few substances which produce urticaria, the most typical are histamine, peptone, morphine and its esters, atropine,  $\text{CaCl}_2$ , urea and  $\text{HCHO}$ . The effect cannot be explained by vasoconstriction, vasodilatation or capillary paralysis, acidosis or various forms of inflammatory or sensory irritation or osmosis. It does not appear to be connected with any known chemical or pharmacological relations, but is presumably due to a specific increase of the permeability of capillaries. Many substances that produce cutaneous reaction on systemic administration fail to do so when applied locally. Blanching is produced by epinephrine, pituitary and hydrastine, but not with Ba salts and tyramine.  $\text{NO}_2$  does not cause vasodilatation. Several distinct groups of sensory actions are distinguishable, such as itching of urticarial agents; smarting and burning of simple irritants; formication of aconite and lancinating pain of veratrine.

**Egg Albumin, Seasonal Toxicity of.** F. Maigou. (*Comptes rend.*, 1918, 166, 919.) Egg albumin, as an exclusive diet, is incapable of sustaining life in white rats, or of maintaining their body weight. In May and in October, white rats fed solely on egg albumin die rapidly of acute intoxication of the nervous system. In August and January, they slowly succumb from marasmus. It is considered that this seasonal variation in the toxic effect may throw some light on the occasional appearance of certain maladies of the nutrition, such as rheumatism and eczema, following a highly nitrogenous diet. Acute egg albumin poisoning produces coma.

**Eggs, Toxicity of.** G. Linossier. (*Bull. Acad. Méd.*, 1918, 79, 237, through *J. Amer. Med. Assoc.*, 1918, 70, 1573.) There seems to be a tendency now to disparage eggs as liable to prove toxic under certain conditions, even when quite fresh. There is undoubtedly some substance in eggs which has a toxic action on certain predisposed persons. The predisposition is often congenital. When it is acquired, it seems to be connected with liver and intestinal disturbance. The toxic substance is probably a toxalbumin, and it is destroyed by heat. All that is necessary is to coagulate all the albumin in the egg, in the yolk as well as in the white. The reason that cooked egg

seems to be harder of digestion than raw, is because it is digested in the stomach, while the raw egg is passed on undigested, and is not hydrolyzed until it reaches the intestines. The action of heat should not be prolonged after coagulation is complete, as the harder the coagulation, the more difficult the digestion by the gastric juice. There are no grounds for denying eggs in liver diseases, but with a tendency to gallstones it is wiser not to allow more than one egg a day, so as not to increase the cholesterolemia. Well cooked eggs can be allowed with albuminuria, but persons with interstitial nephritis and hypercholesterolemia had better refrain from eggs.

**Emetine, Effect of, on Malignant Tumours.** R. Lewisohn. (*J. Amer. Med. Assoc.*, 1918, **70**, 9.) Injection of emetine into carcinoma and sarcoma may cause a complete macroscopic disappearance of most of the tumours. This disappearance is not due to a specific action of emetine on the tumour cells. The action of the drug is purely caustic, similar, though in less degree, to the action of phenol or  $\text{ZnCl}_2$ . Repeated intravenous injections of emetine do not affect the growth of carcinomas and sarcomas. This proves conclusively that the drug has no specific effect on the growth of malignant tumours. These observations do not strengthen the amoebic theory of malignant tumours.

**Emetine, Extract of Ipecacuanha and de-Emetinized Ipecacuanha in the Treatment of Dysentery.** — Huerre. (*J. Pharm. Chim.*, 1918, **17**, 25.) The apparently conflicting statements as to the therapeutic value of emetine, of the galenicals of ipecacuanha containing all the alkaloids, and of de-emetinized ipecacuanha are reviewed at considerable length. The conclusions arrived at are that emetine and the entire ipecacuanha are indicated for the treatment of amoebic dysentery. They are, however, contra-indicated in bacillary dysentery caused by the bacilli of His, Flexner, and Shiga. For this form the de-emetinized drug gives good results. In the discussion which followed it was pointed out that possibly any therapeutic activity the latter might have might be due to the tannoids or to the emetinic acid.

**Emetidine (Kryptonine), Pharmacology of.** H. S. Browne. (*J. Amer. Pharm. Assoc.*, 1918, **6**, 1041.) The name kryptonine given by Lloyd to the amorphous alkaloid isolated by him from ipecacuanha (*Y.B.*, 1917, 9) has been altered to emetoid-



ine, on account of its pharmacological affinity to emetine. Emetidine seems to be somewhat less toxic for both paramacia and for rabbits than emetine. It produces a similar fall in blood pressure when injected intravenously. It depresses the central nervous system and respiration as does emetine. It produces emesis by local irritant action rather than by direct stimulation of the vomiting centre, which also agrees with the action of emetine.

**Epinephrine Treatment of Cholera and Seasickness.** N a a m é. (*Paris médical*, 1917, 7, 415, through *J. Amer. Med. Assoc.*, 1918, 70, 132.) The author has long insisted that cholera is a syndrome of acute suprarenal insufficiency. This suprarenal deficit is found in different infectious and toxic states but in cholera it reaches its acme. A number of recent writers are cited who have described choleriform attacks in fatal erysipelas, in dysentery, etc., all traced to suprarenal insufficiency, and Sergent reported in 1915 the discovery of lesions in the suprarenals in an epidemic of false cholera finally explained by cadaver contamination of the drinking water. Epinephrine should be given systematically in cholera and other diseases with pure glandular symptomatology. A close analogy exists between the symptoms of seasickness and suprarenal insufficiency resulting from purely nervous inhibition of suprarenal functioning. The swaying of the ship swings the viscera in an unaccustomed way; as they impinge on the solar plexus they irritate it more or less, and this in turn inhibits normal suprarenal functioning. A belt holds the viscera more firmly in place and hence aids in warding off seasickness. Children are less subject to seasickness. Their organs are small and do not swing around so much, while their abdominal walls are more elastic. This assumption explains why seasickness stops as soon as the foot touches dry land. Sedatives have no influence on seasickness, but it is found that epinephrine is effectual: 5 or 6 mg. fractioned in three doses at intervals of an hour, or before meals. The discomfort subsides and the meals can be taken as usual. Car sickness is a form of the same trouble, and yields to a small dose of epinephrine.

**Epinephrine Inhibits Flow of Pancreatic Secretion.** F. C. M a n n and L. C. M c L a c h l i n. (*J. Pharmacol.*, 1917, 10, 251, through *J. Amer. Med. Assoc.*, 1917, 69, 1739.) Large doses of epinephrine which produce a marked rise of blood pres-

sure, always decrease the flow of pancreatic secretion. Very small doses usually also decrease the activity of the pancreas regardless of whether a pressor or depressor action of blood pressure is produced. Epinephrine also decreases pancreatic volume at the same time it decreases pancreatic flow, regardless of its effect on the general blood pressure. While it is not stated definitely that epinephrine does not specifically inhibit the pancreatic cells, it would seem that its action in inhibiting the pancreatic secretion depends on the amount of blood passing through the gland. Large doses of epinephrine, even though general blood pressure is greatly increased, decrease the amount of blood to the pancreas by excessive local constriction, and thus decrease the flow of pancreatic juice. Small doses may or may not affect the secretion of the pancreas, depending on whether the relation of the local constriction and the changes in general blood pressure change the amount of blood going to the gland. The pancreatic vessels may constrict with a dose which will produce enough dilatation elsewhere to cause a decrease in general blood pressure, or which may not produce enough general action to affect blood pressure at all. In every case the cause is the same, a reduction of the amount of blood passing through the gland per unit of time. However, these results all tend to accentuate the fact that the pancreatic vessels seem to be more sensitive toward the pressor action of epinephrine than those of any other region concerning which data are available.

**Ether Analgesia for Painful Dressings.** J. G w a t h m e y and H. T. K a r s n e r. (*J. Amer. Med. Assoc.*, 1918, **70**, 993.) The following mixture is given by the mouth to produce analgesia before dressing painful wounds and before minor operations: Ether, 4 fluid drachms; liquid paraffin, 4 fluid drachms; peppermint water, 5 minims. In order to disguise the nauseous taste of the ether, the patient is directed to rinse the mouth with port wine for 30 seconds and then swallow the wine: the ether dose is immediately taken, and then the remains of a glassful of port. Satisfactory results have followed this method of producing analgesia, especially in the treatment of fractures, deep wounds, adhering dressings and multiple incisions of abscesses. Ten to 20 minutes is allowed to elapse for the effect to develop. The method is safer and more convenient for suitable cases than general anaesthesia.

**Ethyl-Hydrocupreine or Quinine Mouthwash for Disinfection**

**of Pneumococcus Carriers.** J. A. Kolmer and E. Steinfield. (*J. Amer. Med. Assoc.*, 1918, **76**, 14.) The results of experiments with sputum have indicated that dilutions of ethylhydrocupreine hydrochloride as high as 1 : 30,000 and even to 1 : 160,000 had appreciable and frequently well defined pneumococidal activity, while a 1 : 10,000 dilution almost invariably disinfected sputum containing pneumococci, as determined by intraperitoneal injection in mice; with such cinchona alkaloids as quinine bisulphate, dilutions in sputum varying from 1 : 10,000 to 1 : 20,000 were found to possess well defined pneumococidal activity. It was found that 1 : 10,000 dilutions of ethylhydrocupreine hydrochloride or quinine bisulphate, quinine hydrobromide and other cinchona alkaloids in a 1 : 10 dilution of liquor thymolis may be readily used as mouth washes and gargles. The slightly bitter taste remaining after the use of any of these is readily removed by rinsing the mouth with plain water.

Ethylcupreine hydrochloride is found to be the most efficient of the cinchona bases as a germicide, but since this drug is scarce at present, one of the commoner cinchona alkaloids, as quinine bisulphate or quinine hydrobromide, may be substituted, although these are not as powerful. Similar dilutions in undiluted Dobell's solution may be used for douching or spraying the nose, or, incorporated in a dental cream, for cleansing the teeth. For washing the mouth and gargling, a solution is conveniently prepared after the following formula: Ethylhydrocupreine hydrochloride or quinine bisulphate, 0.005 Gm.; liquor thymolis, 5.0 c.c.; distilled water, sufficient to make 50.0 c.c. The systematic use of either of these mixtures may serve to destroy or inhibit the multiplication of virulent and disease producing types of pneumococci among contacts and convalescents, and thereby aid in the prophylaxis of lobar pneumonia.

**Galega officinalis, Alleged Galactagogue Action of.** Marian Lewis and A. J. Carlson. (*J. Amer. Med. Assoc.*, 1917, **68**, 1570.) Experiments conducted on lactating goats and bitches showed that preparations of galega are quite devoid of any galactagogue action. (See also *Gen. Index*.)

**Ginseng, Experimental Study of.** W. Sakai. (*Sei-I-Kwai Med. J.*, 1917, **36**, through *J. Amer. Med. Assoc.*, 1918, **70**, 349.) Ginseng has not only a sedative action on the cerebrum, but

also a stimulating action on some functions necessary to life ; however, its action is not so great as was believed formerly. It may be useful as a tonic or stimulant. (See also *Y.B.*, 1916, 220, and *Gen. Index.*)

**Gland Extracts and Drugs, Action of Certain, upon the Uterus of the Rat.** M. Itagaki. (*Quart. J. Exp. Physiol.*, 1917, 11, 39, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 823.) Upon the rat uterus, extract of posterior lobe of pituitary always produces an increase of tone, solutions of adrenaline inhibit the rhythmic contractions, extract of thyroid occasionally produces an increase of tone, but generally has no effect, extracts of orchitic substance, of uterus and of brain have no appreciable effect. The action of nicotine is variable. Weak solutions produce an increase of tone. Stronger solutions produce inhibition alone. The action of pilocarpine is inconstant, but usually an increase of tone is produced. Weak solutions of atropine produce increase of the rhythmic contractions, stronger solutions a slight diminution.  $\text{BaCl}_2$  in all strengths which produce any effect, causes increased tone and stimulates the rhythmic contractions.

**Gynecological Douching Agents, the Germicidal Value of.** J. R. Stark. (*J. Lab. Clin. Med.*, 1917, 3, 199-202, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 379.) The solutions used were  $\text{HgCl}_2$  in the strengths of 1 : 1000, 1 : 4000, 1 : 15,000 ; lysol, 0.5 per cent. ;  $\text{KMnO}_4$ , 1 : 1500 ; and normal  $\text{NaCl}$  solution as a control. The bacteria employed were 24-hour stock cultures of *Staphylococcus pyogenes aureus*, obtained from a case of furunculosis, *B. coli* of intestinal origin, and *B. subtilis*, a spore-former used to determine the action of the germicide on this type of organism. In experiments performed *in vitro*,  $\text{HgCl}_2$  destroyed all three of these organisms in dilutions of 1 : 1000 and 1 : 4000 in 15 minutes. Lysol, 0.5 per cent., is as effective a germicide as a 1 : 15000  $\text{HgCl}_2$  solution when tested in the same way.  $\text{KMnO}_4$  in dilution of 1 : 1500 was wholly ineffective. The solutions used did not simply inhibit bacterial growth but destroyed it whenever effective at all. Washing or irrigating with normal salt solution will not remove all bacterial growth.

***Illicium religiosum*, Poisoning by.** L. E. and A. L. Guerrero and D. de la Pax. (*Philip. J. Sci., J. Amer. Med.*



*Assoc.*, 1917, **69**, 943.) The authors record four cases of poisoning by the fruits of *Illicium religiosum* in their practice in the Philippines. The symptoms were foaming at the mouth, vomiting, diarrhoea, thirst, unconsciousness, tonic and clonic convulsions, profuse sweating, cramp, oliguria or anuria, paresis of lower limbs, and exhaustion. The best method of treatment is the rapid evacuation of the stomach, either by the stomach tube, or by apomorphine. The latter is preferable to other emetics on account of its prompt action and the fact that it does not cause, or increase, local irritation. Demulcents should then be given. Liquid paraffin is best for this purpose. The convulsions should be controlled by the cautious inhalation of ether followed by the administration of chloral hydrate and bromides. In the later stages, when paralytic symptoms predominate, these drugs are emphatically contra-indicated. Then the working of the paralysed respiratory centre, the heart, and the organisms of elimination must all be stimulated.

**Ipecacuanha Alkaloids, Irritant and Emetic Action of.** A. L. Walters, C. R. Eckler and E. W. Koch. (*J. Pharmacol.*, 1917, **10**, 185-97, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2933.) In cats the emetic dose of emetine-HCl is about twice that of cephaeline-HCl; and the higher homologues of this series decrease in emetic power in very much the same ratio as they do in toxicity. Emetine and cephaeline are the most irritant of the series studied. Cephaeline isoamyl ether is least irritating when tested on the conjunctiva of the rabbit, but when injected intramuscularly it is the most irritant. This ether also causes severe pain, soreness and local inflammation when injected hypodermically in human individuals while the cephaeline propyl ether phosphate gives only a slight reaction. (See also following abstract.)

**Ipecacuanha Alkaloids, Pharmacology of.** A. L. Walters and E. W. Koch. (*J. Pharmacol.*, 1917, **10**, 86, 185, through *J. Amer. Med. Assoc.*, 1917, **69**, 315, 1298.) From an analysis of 145 different lots and samples of ipecac., representing in all many thousands of pounds of drug, the authors' records show that commercial ipecac. averages 2.17 per cent. of total alkaloids. The lowest assay was 1.83 and the highest 2.84 per cent. The average amount of emetine is to that of cephaeline as 63 is to 37. There is little or no difference in alkaloidal strength between Rio and Carthagena ipecac. and the partition of the emetine

and cephaeline in the two species is in general the same. From experiments and case reports it would seem that the toxicity of emetine has generally been overstated. The usual dosage of 0.5 to 1 grain of emetine per day for 6 or 8 days is certainly on the safe side unless the patient shows an unusual susceptibility to the drug. The real danger lies in the too long continued use of therapeutic doses, an entirely unnecessary procedure in the treatment of amebiasis, as the active endamebas will be destroyed by 0.5 or 1 grain doses in 6 to 12 days, and the encysted forms, if present, will not be destroyed by continued emetine injections.

With cats, the emetic dose of emetine hydrochloride is approximately twice that of cephaeline hydrochloride and the higher homologues of this series decrease in emetic power very much in the same ratio as they do in toxicity. Furthermore, it has been shown that the hydrochloride, hydrobromide and hydroiodide of emetine vary only slightly in their emetic power, but that the hydroiodide of cephaeline iso-amyl ether, due to its relative insolubility is about one half as emetic as the hydrobromide or hydrochloride of cephaeline iso-amyl ether and only one-sixth as emetic as emetine hydrochloride. When tested on the conjunctiva of rabbits, emetine and cephaeline are the most irritant of this series and cephaeline iso-amyl ether is least irritating. When injected intramuscularly in rabbits cephaeline iso-amyl ether is the most irritant while the difference between the other less irritant members of the series is not marked. Cephaeline propyl ether phosphate gives no more than a slight local reaction when injected hypodermically into persons, while cephaeline iso-amyl ether salts cause severe pain, soreness and local inflammation. (See also *Y.B.*, 1905, 185; 1912, 222, 269; 1913, 242; 1914, 171; 1915, 206, 207, 208; 1916, 283, 284; 1917, 181, 221.)

**Ipecacuanha Alkaloids, Protozoöcidal and Bactericidal Action of.** A. L. Walters, W. F. Baker and E. W. Koch. (*J. Pharm. Expt. Ther.*, 1917, 10, 341, through *J. Chem. Soc.*, 1918, 114, (I), 92.) When solutions of emetine hydrochloride of 0.0005 per cent. strength are in contact with cultures of amoebas for an hour, many of the amoebas are destroyed, but transplants from these cultures to fresh agar plates show a certain amount of growth of amoebas which is retarded or delayed, due probably to the development of encysted or resistant forms. Stronger solu-

tions of emetine hydrochloride are more toxic, but even when a 1 per cent. solution is employed, some amoebas may still be living at the end of an hour. The propyl and isoamyl ethers of cephaeline are more toxic towards amoebas than emetine. Methylating cephaeline to form emetine is known to increase the toxic action towards *Endamoeba buccalis* and paramoecia, and the substitution of the methyl group by ethyl, propyl, butyl, isoamyl, or allyl further intensifies this action. Cephaeline isoamyl ether phosphate is the most effective alkaloid of this group in killing paramoecia, being 15 to 20 times as potent as emetine phosphate. Tested on *Staphylococcus aureus*, cephaeline propyl ether phosphate is bactericidal in solutions of 0.5 per cent., and the corresponding isoamyl ether in solutions of 0.025 per cent. strength. Both these derivatives are much stronger than emetine in bactericidal action. (See also *Y.B.*, 1912, 267; 1913, 242; 1914, 170; 1915, 206, 207, 208; 1916, 283; 1917, 221.)

**Ipecacuanha Alkaloids, Therapeutic Action of, in Amoebic Dysentery.** H. H. Dale and C. Dobell. (*J. Path. Exp. Therap.*, 1917, 10, 399, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 390.) Emetine and the other alkaloids of ipecacuanha exhibited no characteristically high toxicity for the amoebae, as compared with that of some other alkaloids. Certain samples of *E. histolytica* from kittens survived the action of 1-1,000 and even 1-100 emetine solutions, for periods up to an hour. Amoebae which survived treatment by 1-1000 emetine were found to be still capable of infecting kittens. Experimental dysentery in kittens was refractory to all kinds of treatment. Neither the ipecacuanha alkaloids, nor other substances having a powerful action on the amoebae *in vitro*, could cure the infection or definitely modify its course. Methylpsychotrine, which is more toxic for *E. histolytica*, when tested *in vitro*, and much less toxic for mammals than emetine, has been tested clinically on cases of amoebic infection in man. It appeared to be entirely devoid of therapeutic action, though given in relatively very large doses. On the basis of these results it is suggested that the theory of the mode of action of emetine in amoebic dysentery needs reconsideration. Alternatives are discussed to the theory of direct amoebicidal action, which seems to be no longer tenable; and it is suggested that the therapeutic efficacy of emetine is a result of its action upon the host rather than upon the para-

site. (See also *Y.B.*, 1905, 185 ; 1912, 222, 267 ; 1913, 242 ; 1914, 170 ; 1915, 206 ; 1916, 283 ; 1917, 221 ; and *Gen. Index*.)

**Juglone as a Remedy for Skin Diseases.** Brissemoret and Michaud. (*J. Pharm. Chim.*, 1917, 16, 282.) Having observed that the quinone peroxides as a class have a very powerful action on skin, a portion of the quinone being fixed forming a leather, another being reduced to the corresponding hydroquinone, it was inferred that they should exercise exfoliative and keratoplastic properties when applied for the treatment of diseases of that integument. For this purpose benzoquinone and juglone were employed. At a meeting of the Société de Thérapeutique in June last the authors gave the results of a number of experiments with juglone applied as an ointment or in solution. Juglone acts as a powerful exfoliant. It causes mortification of horny layers and the superior layers of the mucous body, causing these to fall off rapidly as scales. It stimulates, but does not destroy the generative basilar layer so that healthy skin is quickly re-formed. In the clinical tests juglone was used as a 1 : 200 solution in chloroform, sometimes with the addition of oil or vaseline. Of 53 cases of eczema treated with this 49 were cured. Seventeen cases of impetigo were rapidly cured by the application of : Chloroformic solution of juglone, 1 : 200, 1 ; vaseline, 2. Out of 23 cases of psoriasis 18 were cured and 5 were lost sight of. Juglone is also useful in preventing loss of hair and in stimulating its growth on the scalp. The opinion is expressed that juglone will prove to be most valuable in the therapeutics of skin affections.

**Kalmia latifolia, Pharmacology of.** R. V. Hadley. (*J. Am. Inst. Homoeopathy*, 1917, 10, 553, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 949.) Using pithed frogs, *Kalmia* produced a slowing of the heart, and increased the strength of the cardiac contractions. The action on the heart of the dog was also studied, the following results being obtained : Rather moderate doses were required to produce circulatory changes ; the results varied with the size of the dose ; primary and secondary effects were produced. Small doses occasioned : (a) rise in blood pressure (primary effect) followed by fall in blood pressure (secondary effect), (b) increase in strength of cardiac impulse or pulse (primary effect) followed by weak, feeble pulse (secondary effect), (c) slight increase in rate of the heart's action. Larger, toxic doses produced a marked slowing of the heart in diastole,



as perhaps their most noticeable effect. (See also *Y.B.*, 1912, 128, 212, and *Gen. Index*.)

**Lathyrism.** R. Stockman. (*Edinburgh Med. J.*, 1917, 19, 277, 297, through *J. Am. Med. Assoc.*, 69, 2071, 2072.) The results of experiments on birds and animals showed that both large and small varieties of peas (*Lathyrus sativus*) are poisonous, different samples of peas varying greatly in their toxicity. The poisonous substance is an alkaloid. Susceptibility of animals varies greatly with the species and with individuals of the same species. In monkeys and other susceptible lower animals prolonged feeding causes paralysis of the peripheral nerves, along with other symptoms due apparently to action on the central nervous system. A single large dose of the alkaloid paralyzes the terminations of the motor nerves and also affects other parts of the nervous system. Histological examination of the muscles and nervous system in poisoned monkeys showed no structural changes. Lathyrism in man is a chronic nervous disease due to the habitual use as food of the peas of certain species of *Lathyrus*; it occurs endemically and epidemically. The symptoms appear only after the peas have been eaten for some time, the period varying according to the quantity consumed and the amount of poisonous alkaloid present. The prominent symptoms are cramps, paralysis and a dragging of the feet when walking. (See also *Y.B.*, 1913, 276.)

**Lythrum salicaria and its Glucoside, Therapeutic Use of.** — Gougeon and Laumonici. (*L'Union pharm.*, 1918, 59, 147.) *Lythrum salicaria* is an old remedy for diarrhoea, and as an astringent. In 1916 Viel isolated a glucoside, *salicarin*, which occurs in the proportion of 0.8 to 1.92 per cent. The glucoside has been given with excellent results in cases of enteritis and dysentery. The glucoside is prepared in two forms: a 1:50 aqueous solution; and compressed tablets, containing each 5 Mgm. of salicarin. A medium dose is 8 to 20 of these or 4 to 100 drops of the solution in 24 hours. One-fourth of the above doses should be given to children, according to age.

**Mastic Test for Syphilis, Mechanism and Significance of.** S. L. Immerman. (*J. Am. Med. Assoc.*, 1917, 69, 2027.) The amount of precipitation in the gum mastic reaction depends on the quantity of globulin present in the spinal fluid tested. The

maximum precipitation is obtained with an optimum amount of globulin. The reaction obtained does not determine whether the fluid is syphilitic or nonsyphilitic. The test is not equivalent to or supplementary to the colloidal gold reaction. As a clinical test, the information obtained from the gum mastic reaction can be obtained by much simpler means. (See also *Y.B.*, 1917, 35.)

**Mercuric Chloride Poisoning, CaS as Antidote to.** J. H. Wilms. (*J. Lab. Clin. Med.*, 1917, 2, 445, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2117.) The antidote recommended is an aqueous solution of CaS in a dilution of 1 grain to the ounce of distilled  $H_2O$ . The dose is 1 grain of the antidote to each grain of  $HgCl_2$  taken. In advanced cases the intravenous method of introducing the solution is the safest and most rapid. CaS may also be administered by mouth when the intravenous method is not practicable or both methods may be used. The use of CaS by mouth may be continued until all symptoms of mercurialism have disappeared, since it is non-toxic. Recovery has taken place in hospital patients when the antidote was administered by mouth as late as 12 hours after taking 7.5 grains of  $HgCl_2$  and as late as 30 hours after when the antidote was given intravenously. Deteriorated solution of CaS produced severe convulsions due to the action of the Ca on the spinal cord. Local antidoting in the stomach by the use of white of egg and lavage with large quantity of water is useless;  $HgCl_2$  is so rapidly absorbed from the stomach that very little remains at the end of 5 minutes. (See also *Y.B.*, 1915, 231, 238, 239; 1917, 219 and following abstracts.)

**Mercuric Chloride Poisoning, Principles of Treatment of.** W. D. Sansum. (*J. Amer. Med. Assoc.*, 1918, 70, 824.) There is no experimental basis for the belief that the promotion of free diuresis contributes materially to the chances of recovery in  $HgCl_2$  poisoning. Combined treatments which involve sweating, diuresis and increased elimination from the bowel probably owe their value to the latter effort. When 4 Mgm. or more of  $HgCl_2$  per kilo bodyweight has entered the tissues at large, death regularly occurs. There are at present no adequate grounds for considering it preventable by any method of treatment. Practical treatment should be directed to the mechanical removal of the poison from the alimentary tract, and antidoting the poison before it leaves the portal circulation,

that is particularly before absorption. Antidotes given by the mouth and by hypodermic injection to dogs and rabbits failed to avert death when  $\text{HgCl}_2$  was injected into the circulation in the dose of 4 Mgm. per kilo.

**Mercuric Chloride Poisoning, Value of Hypophosphites and Phosphites as Antidotes to.** B. Fantus and E. G. Hyatt. (*J. Lab. Clin. Med.*, 1917, 2, 813-8.) A uniformly fatal dose for rabbits is 0.04 Gm. of  $\text{HgCl}_2$  per kg., provided the rabbits have been fed on oats and carrots and provided the  $\text{HgCl}_2$  solution has been freshly prepared with distilled water. In the treated cases, the antidote was administered 5 minutes after the  $\text{HgCl}_2$  had been given. Carter's antidote, consisting of a mixture of  $\text{Na}_2\text{PHO}_3$  10 parts, and  $\text{NaC}_2\text{H}_3\text{O}_2$  6.6 parts, is undoubtedly of value in saving lives of rabbits poisoned with a fatal dose of  $\text{HgCl}_2$ . While no animal in the control series of the poisoned animals survived over 100 days, 7 among 21 rabbits, of those treated with Carter's antidote, recovered. The average lethal period for the treated animals was  $44\frac{1}{2}$  days, against  $7\frac{3}{4}$  days in the control series. The efficiency of a mixture of  $\text{NaPH}_2\text{O}_2$  and  $\text{H}_2\text{O}_2$  is but little inferior, and in certain proportions, it is equal to Carter's antidote. The  $\text{H}_2\text{O}_2$  is used because it was found that in test tube experiments it appreciably accelerates the reduction of  $\text{HgCl}_2$  by hypophosphite. (See also *Y.B.*, 1917, 219.)

**Mercury, Absorption of, when applied by Inunction.** J. F. Schamberg, J. A. Kolmer, and G. W. Raizios. (*J. Amer. Med. Assoc.*, 1918, 70, 142.) Animal experiments demonstrate that the chief avenue of absorption of Hg, when applied by inunction, is the skin. Rabbits may be fatally poisoned with Hg by inunction, even when no opportunity of absorption through the lungs exists. Rabbits breathing a Hg-laden atmosphere may absorb considerable quantities of Hg through the lungs, but experiments show that the respiratory absorption is far less important than the cutaneous absorption. Metallic Hg in the form of the official mercurial ointment is more volatile and is much more apt to be absorbed by the lungs, than  $\text{HgCl}$  ointments of equal strength.  $\text{HgCl}$  ointments are fully as well if not better absorbed through the skin as the ordinary blue ointment. There appears to be no reason why  $\text{HgCl}$  should not supplant the unclean blue ointment rubbings which have been so long in use.

**Milk, The Antiscorbutic Value of, in Infant Feeding.** Harriette Chick, E. Margaret Hume and Ruth F. Skelton. (*Lancet*, 1918, **194**.) Raw cows' milk contains the accessory food factor (vitamine) which protects from scurvy, but this is present in small amounts, and is further diminished by heating or drying. Infants fed on heated or dried milk, or on any milk substitute should receive also some antiscorbutic ration, such as fresh fruit juice or potato. It is probable that the raw juices of turnips and swedes may also be employed.

**Mustard Oil, Cutaneous Irritation by, Influenced by Various Solvents.** T. Sollmann. (*J. Pharmacol.*, 1918, **11**, 229; through *J. Amer. Med. Assoc.*, 1918, **70**, 1893.) Olive oil and other good solvents for mustard oil hinder its penetration into the skin. The greatest irritation is obtained by watery suspensions, for instance, in mucilage. Solutions in olive oil and turpentine produce practically no hyperemia; ether and absolute alcohol produce very little; 95 per cent. alcohol causes a distinct hyperemia, whereas 50 per cent. alcohol causes marked and lasting hyperemia; mucilage of acacia and simple syrup cause the most intense and persistent hyperemia.

**Opium Alkaloids, The Toxic Action of, Individually and in Combination with each other on Paramecia.** D. I. Macht and H. G. Fisher. (*J. Pharmacol.*, 1917, **10**, 95, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2828.) The effects of the drugs were studied on hanging drop preparations of *Paramecium putrinum*. These generally consisted of a slowing to paralysis of ciliary movements and then alteration of the shape of the animal, which became round, and finally death and disintegration. The pyridine-phenanthrene group of alkaloids (morphine, codeine, thebaine, heroine, dionine, paracodeine, apomorphine and apocodeine) was found to be non-toxic or very little toxic, while the benzyl-isoquinoline group (papaverine, narcotine and narceine) was very toxic. Papaverine showed a greater toxicity than quinine, but less than emetine. The cotarnine salts (stypticin and styptol) and hydrastinine were innocuous to the paramecia. Synergism was shown with combinations of members of the two opposite groups of alkaloids, but not of members of the same group. Benzyl acetate and benzoate were both found to be toxic, but isoquinoline sulphate was not. It appears from this and previous work that



the toxicity of the benzyl-isoquinoline group of alkaloids is due to the benzyl group.

**Ovarian Extracts, Cow, Action of, upon the Muscular Tissue.**

M. I t a g a k i. (*Quart. J. Exp. Physiol.*, 1917, **11**, 27, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 823.) Extract of hilum ovarii has the opposite effect to extract of corpus luteum upon the movements of the rat uterus, causing inhibition instead of contraction. The uterus of other animals is affected differently, for in the rabbit, cat and guineapig an extract of the hilum usually has the result of producing an increase of tone. Liquor folliculi produces an increase of tone of the uterine muscle in the rat, rabbit and cat, or at any rate an increase in height of the rhythmic contractions. When applied to the whole thickness of the intestinal tube, all the extracts—hilum, liquor folliculi and whole ovary—produce an increase of tone, whereas a strip of the longitudinal coat of rabbit intestine is sent into relaxation by extracts of hilum. A fall of blood pressure is produced by intravenous injection of all three extracts.

**Oxygen, Chloroform, and Alcohol Vapour for Infected Wounds.**

A. C a b a n e s. (*Comptes rend.*, 1917, 165.) Oxygen from a cylinder is bubbled through a mixture of  $\text{CHCl}_3$  1 volume;  $\text{EtOH}$ , 6 volumes; the gas, charged with the vapours of the liquids is then led by means of a rubber tube, or preferably by a Nelaton's sound into the purulent cavity. Under the antiseptic action of the gas, which penetrates into all parts of the wound, the secretion of pus rapidly diminishes. Leucocytosis is stimulated by the  $\text{CHCl}_3$  and haematosiis by the O. The patient's temperature falls quickly. The treatment is painless and allows of permanent antisepsis with a dry dressing, the most satisfactory of all forms of dressing.

**Physiology of Olfaction.** A. D u r a n d. (*Comptes rend.*, 1918, **166**, 129.) Coulier in 1875 showed that air contains centres for aqueous vapour, which Aitken, Thomson and others have identified with ions. Bloch proved that dust free air which had passed over phosphorus and become thereby charged with large ions, had acquired an increased condensive activity for aqueous vapour. The author has repeated Coulier's experiments, employing filtered dust-free air, which was then passed over camphor, musk and other strong-smelling substances. In all cases when this air had become odorous, its power of

condensing aqueous vapour was markedly increased. Consequently the theory is advanced that the sense of smell depends on the presence in the air of these odorant ions, acting as nuclei of condensation. It is influenced by the hygrometric condition of the atmosphere. The action of inspiration causes the detention of some of these particles in the olfactory region and this gives rise to the sensation of odour.

**Pilocarpine, Certain Antagonists of.** G. Ransom. (*J. Pharmacol.*, 1917, **10**, 169, through *J. Amer. Med. Assoc.*, 1917, **69**, 1298.) The chronotrope and inotrope actions of pilocarpine are fundamentally distinct. They are both vagal effects but different groups of vagal fibres are concerned in their production and hence one action can be antagonized while the other remains intact. Atropine paralyses vagal endings and hence entirely antagonizes the heart actions of pilocarpines. Strontium, digitalis, agaricin and saponin, which, without affecting the vagus, have a positive inotrope action on the frog's heart, antagonize the negative inotrope action of pilocarpine but leave the negative chronotrope effect unimpaired. Epinephrine and caffeine antagonize both the actions of pilocarpine, not because they affect either of the two sets of vagal fibres, but because they produce effects the reverse of those which stimulation of the two vagal groups brings about.

**Pine Oil Disinfectants, Low Efficiency of.** H. K. Mulford. (*Drugg. Circ.*, 1918, **72**, 25A.) Pine oil disinfectants are of the emulsion type, being made from pine oil obtained by destructive distillation of pine wood, rosin and NaOH solution. They have the advantage over disinfectants of the emulsion type made from coal tar products of possessing a more pleasing odour. A typical formula for a pine oil disinfectant is as follows: Pine oil 1000 Gm., rosin 400 Gm. and 25 per cent. NaOH solution 200 Gm. The rosin is dissolved in the pine oil by means of gentle heating on a water-bath, and the caustic soda solution is then added and the mixture allowed to stand for a day. A disinfectant made in this way will vary in its colour from a light amber to almost coal black, according to the colour of the pine oil and rosin used. It will be perfectly clear or easily clarified by settling, will give satisfactory opaque emulsions in 3, 5 and 10 per cent. dilutions with water, and will contain free alkali equivalent to 0.3 c.c. N/2  $\text{H}_2\text{SO}_4$  per 10 Gm. sample. A number of pine oils recently examined did not yield phenol coefficients which

compared favourably with efficient disinfectants prepared with cresol. One sample of pine oil disinfectant examined showed a phenol coefficient of 0.805. Another sample 0.513, and a third sample 0.903, whereas a standard cresol preparation had the phenol equivalent of 3 to 6.

**Pituitary Extract in Treatment of Incontinence of Urine.** (*Russki Vrach*, 1917, **16**, 409, through *J. Amer. Med. Assoc.*, 1917, **69**, 2077.) Nineteen cases of nocturnal incontinence in children and adults are reported in which prompt benefit followed treatment with pituitary extract. All the patients were relieved of their incontinence, including 10 children who had no other known anomaly, a few young men who had incontinence both day and night, and five or six men of 38 to 42 with exclusively nocturnal incontinence. The patients have been under observation for three or four months and there has been no recurrence of the incontinence to date in any of them.

**Pituitrin and Adrenaline, Influence of on the Pupil of Rabbits.** T. S. Githens and S. J. Meltzer. (*Proc. Soc. Exp. Biol. Med.*, 1916, **14**, 53-4, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, **11**, 2234.) The intravenous injection of pituitrin produces a considerable constriction of the pupil, while adrenaline produces a moderate dilatation of short duration, and pituitrin counteracts to a degree the dilating effect of adrenaline.

**Potatoes, Alleged Solanine Poisoning from.** F. W. Harris and T. Cockburn. (*Analyst*, 1918, **43**, 133.) Cases of suspected solanine poisoning from eating sprouting potatoes, although not infrequent on the Continent, appear to be rare in this country. A local epidemic attributed to this cause occurred in November, 1917. A sample of the potatoes from a house in which the only fatal case occurred was examined. The potatoes were normal in appearance, firm and solid, but some on being cut into sections possessed a brownish indefinite line near the periphery. On standing for a short time the sections developed a much more decided pink colour than other samples similarly treated. As the buds on quite a number of the potatoes showed evidence of sprouting, being about  $\frac{1}{4}$  inch in length, it was decided to determine the quantity of solanine they contained. The method of G. Meyer was employed as follows: 500 Gm. of the pared potatoes were finely grated, and the liquid portion separated by pressing in a muslin cloth,

the grater being washed with small quantities of distilled water. After standing for some time the liquid was decanted from the separated starch, which was washed with small quantities of distilled water, the washings being added to the original liquid. After making alkaline with AmOH the liquid was evaporated almost to dryness, and the residue boiled with EtOH and filtered. This treatment with EtOH was repeated twice. The pressed solid portion of the potatoes was also boiled with EtOH in two successive portions and filtered. The united EtOH solutions were evaporated to small bulk, allowed to stand overnight, filtered from any asparagin which had separated out, and the filter-paper washed with EtOH. The filtrate was evaporated to dryness and digested overnight at the ordinary temperature with 250 c.c. of water containing about 3 c.c. strong  $\text{H}_2\text{SO}_4$ , in which the solanine is readily soluble. After filtration and washing the insoluble portion with water the solanine was precipitated with excess of AmOH; the solution raised to about  $50^\circ\text{C}$ ., filtered and washed, and the solanine dissolved by pouring hot EtOH through the paper. The EtOH solution was received in a tared dish, the EtOH evaporated off, and the solanine weighed after treating with small quantities of  $\text{Et}_2\text{O}$  and drying in the steam oven.

The amount of solanine found was 0.41 per thousand. A sample of potatoes from the store supposed to be of the same bulk gave 0.079 per thousand. The normal content of solanine is stated to range from 0.04 to 0.089 per thousand, at different seasons of the year. It is evident, therefore, that the suspected potatoes contained a great excess of solanine. It would seem that caution is necessary in the use of sprouting potatoes for food.

**Pruritus Ani, Calomel for.** O. H a m b u r g e r. (*Ugeskrif for Laeger*, through *J. Amer. Med. Assoc.*, 1918, **70**, 1510.) The author has cured a number of patients with long persisting anal pruritus by rubbing with dry calomel. The part is wiped off first with moist cotton, the finger is moistened, and the powder is taken up on the finger and rubbed into the crevices. The itching generally subsides permanently, or at least for several months, after four or five applications of the  $\text{HgCl}$ .

**Quinine Alkaloids, Disinfectant Action of on Pathogenic Bacteria.** R. Bieling. (*Biochem. Zeitsch.*, 1918, **85**, 188, through *J. Chem. Soc.*, 1918, **114**, (1), 243.) The alkaloids



investigated were quinine, optochine (ethylhydrocupreine), eucupine (isoamylhydrocupreine), and the isooctyl-, decyl-, and dodecyl-hydrocupreines. These have been found to have a specific disinfectant action on the bacilli of diphtheria, splenic fever, and tetanus. Eucupine and isooctylhydrocupreine are generally the most effective.

**Rhubarb Leaves, Poisoning with.** Maillart. (*Rev. Med. Suisse Rom.*, through *Med. Rev.*, 1917, 20, 350.) Confirmation of the poisonous nature of boiled rhubarb leaves used as a culinary vegetable is furnished by the author. A case of toxic symptoms following a meal in which rhubarb leaves were mixed with spinach was taken in a Swiss family. Only one member of the family showed serious symptoms, but all were affected. In the worst case, nephritis, with very heavy excretion of albumin occurred. This yielded to appropriate treatment. Another, fatal, case of poisoning from the same cause is alluded to as occurring in Switzerland. The author is doubtful as to  $\text{H}_2\text{C}_2\text{O}_4$  or its salts being the cause of the poisoning since in his case there were no cardiac symptoms. Some other toxic substance, present in the leaves, but not in the stem or root, is considered to be the poison, which causes severe gastro-intestinal disturbance and nephritis. (See also *Y.B.*, 1917, 230.)

**Salts of Sorrel, Nature and Toxicity of.** A. H. Schirm and D. H. Wester. (*Pharm. Weekblad*, 1917, 54, 1346-56.) Of eleven samples purporting to be  $\text{KHC}_2\text{O}_4 \cdot \text{H}_2\text{O}$  or "sorrel salt," only one had that composition. It was labelled "Bioxalas kalicus puriss. cryst. O. P. G." The rest, which were from one to 25 years old, were proved by acidity,  $\text{H}_2\text{O}$  of crystallization, solubility and sp.g. to consist mainly of the tetroxalate,  $\text{KHC}_2\text{O}_4 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ . Hence practically all the "bioxalate" that is sold is mostly the tetroxalate. The lethal dose is variously stated as 15 to 30 Gm.; but fatal cases have been known with as little as 2 Gm. The bioxalate is less poisonous than oxalic acid or the tetroxalate, which are approximately equivalent. Experiments with guinea pigs showed that the greatest effect of the acid is its local action, while the salts are most poisonous after absorption into the body. This may explain why addition of  $\text{Na}_2\text{CO}_3$  to neutralize the acidity of rhubarb and similar foods makes them more dangerous.

**Soap Solution for Treatment of Wounds.** R. G. Dixon and H. T. Bates. (*Lancet*, 1917, 193, 789.) A 1:40 solution

of the *Sapo mollis* B.P. has been found to give satisfactory results in the treatment of small wounds, compound fractures of the bones of the hands and feet, and also of the long bones. In case of deep wounds, Carrel's tubes were used in the ordinary way. The results were likewise usually good in cases of gas gangrene. The soap solution cleans up a wound quickly. The application is much less painful than ordinary dressings. The soap dressings need to be changed only every third or fourth day.

**Sodium Desoxycholate for Buccal Disinfection.** F. M. Wells. (*B.M.J.*, 1917, 2, 6.) Sodium desoxycholate has a powerful solvent action on pneumococci, and is ten times more active than sodium cholate or commercial sodium taurocholate. A combination of sodium desoxycholate and quinine has a much greater bactericidal effect than when these two substances are employed separately. The author prescribes the following formulae: *Mouth Wash*.—Quinine hydrochloride, 5 Gm.; sodium desoxycholate, 40 Gm.; glycerin, 250 c.c.; water to 1,000 c.c. *Mouth Wash Tablets*.—Sodium desoxycholate, gr. j; quinine ethyl carbonate, gr.  $\frac{1}{8}$ ; peppermint oil,  $\frac{1}{20}$  ℥; glycyrrhizin ammoniate, gr. ij; also with acriflavine 1 in 1,000. The taste of the wash would hardly commend it to the general public and it would probably require stringent orders from the doctor to ensure its use.

**Sodium Salts, Therapeutic Superiority of, over K Salts.** (*J. Amer. Med. Assoc.*, 1918, 70, 1001.) The widespread use of potassium salts, instead of the corresponding sodium salts cannot be justified. It is due solely to prejudice and fashion. Therapeutically the sodium salts are as good as, and in some cases better than, potassium salts; they are also much cheaper. Physicians should acquire the habit of prescribing sodium compounds in preference to potassium salts. (This was pointed out by E. White (*Y.B.*, 1915, 242), at the beginning of the war.—Ed., *Y.B.*)

**Strychnine in Body, Fate of.** R. A. Hatcher and C. Eggleston. (*J. Pharmacol.*, 1917, 10, 281, *J. Amer. Med. Assoc.*, 1917, 69, 1739.) Experiments carried out on cats, dogs and guinea pigs showed that toxic doses of strychnine may be administered at short intervals during periods up to 12 days, the total amounts so administered being equal to twenty-five times the single fatal dose, without causing perceptible

lasting effects. Only a small percentage of the strychnine so administered can be recovered from the urine, and none from the faeces. The excretion in the urine usually ceases within 24 to 48 hours. The tissues of the guinea pig (exclusive of the skin, which was not examined) do not yield any strychnine even after the administration of very large amounts, provided that death does not take place within 3 hours after the administration of the last dose. The facts just stated point conclusively to the rapid destruction of the strychnine in the body of the guinea pig and almost as conclusively to that in the bodies of the cat and dog. Perfusion of the liver of the dog and that of the guinea pig with defibrinated blood or Locke's solution to which strychnine has been added results in the destruction of a large part of the strychnine and the storage of a greater portion of the remainder than can be accounted for by the proportion of the perfused fluid held in the liver. The strychnine stored in the liver is loosely bound and the greater part of it may be removed by perfusing once with an amount of Locke's solution equal to several times the weight of the liver. Strychnine is not destroyed in all cases when it is added to defibrinated blood or hashed liver tissue and allowed to stand at body temperature for several hours, but there is some evidence that small amounts may be destroyed in this way under slight differences in conditions which have not been determined. Strychnine is destroyed slowly, or not at all, when it is added to the guinea pig's intestine and its contents and the mixture is allowed to stand at body temperature for 24 hours. Strychnine is not excreted in the bile after its intravenous injection into the dog.

**Sublingual Medication.** B. Robinson. (*New York Medical Record*, through *Med. Press*, 1918, 156, 332.) It is considered to be strange that sublingual medication has been so little used in view of its potential importance in practice and its undoubted value in emergencies. The technique is simplicity itself. A hypodermic tablet is powdered with a knife on a piece of paper and poured behind the front teeth and under the tongue. In a few moments it is dissolved and absorbed, and the constitutional effects of the drug employed appear very rapidly. The tablet may be employed when consciousness has gone and with no risk to the patient. If the patient is conscious he should be told not to swallow until the taste of the drug has almost entirely

disappeared. Since it has been admitted that the gastric juice makes relatively inert the drug which the author considers the most valuable of all cardiac stimulants—namely, strophanthus, it is especially valuable to have the sub-lingual method to fall back on in cases of emergency. This method of administering morphine to the wounded after battles on the Western front, has been found to be very satisfactory. In such times of rush, the administration takes up much less time than the hypodermic injection, and on the field it is easily the safest and most convenient method in any cases where drug administration is required.

**Tethelin from the Anterior Lobe of the Pituitary Gland may be the Source of the Active Principle of the Posterior Lobe.** C. L. A. Schmidt and E. S. May. (*J. Lab. Clin. Med.*, 1917, 2, 708, 711.) Tethelin is proved to have no action on the isolated uterus and to be a nontoxic substance with no marked physiological reactions. It is found, however, that the decomposition products resulting from the action of  $\text{Ba}(\text{OH})_2$  on tethelin are active, cause uterine contraction and resemble the active principle of the posterior lobe of the pituitary gland in general physiological reactions. This suggests that the active substance of the posterior lobe may be derived from the inactive constituent of the anterior lobe of the pituitary.

**Tuberculosis treated with Warm Dry Antiseptic Inhalations.** C. Richet, P. Brodin and F. Saint-Girons. (*Comptes rend.*, 1918, 166, 92.) The method of treatment consists in the inhalation of warm dry air charged with a volatile antiseptic. The latter is dissolved in liquid paraffin, which may be heated. The air to be inspired is drawn through the warm liquid. The volatile antiseptic thus reaches the lungs, free from aqueous vapour, in which condition it is much more active than when accompanied by moisture. The dose of the antiseptic inhaled is adjusted by the regulation of the temperature of the paraffin solution. If the strength of this solution is below 2 : 100, the quantity of antiseptic volatilized is proportional to its vapour tension. Inspiration is made by means of a special glass tubeless Muller valve. The diameter of the aspiration and inspiration tubes is fairly large, 2 cm., so that the inspiration may be rapid and total, and practically effortless. Different antiseptics are used alternately. The same medication is never used continuously except in special cases. Any volatile antiseptic may



be used thus. The authors have obtained the best results with creosote and gomenol. Camphor has been used, but is found to produce vertigo. Phenol causes painful dryness of the pharynx. Iodoform and formalin have been used with caution, but they occasion much irritation. With creosote and gomenol excellent results have been obtained. Even in advanced cases great amelioration in the condition of the patient has followed the treatment. The inhalation has been generally given for 2 hours daily, for 1 hour in the morning and another at night. Although it is too soon yet to pronounce any of the cases to be absolutely cured, the apparent success which has attended a two months' treatment in several cases warrants the preliminary publication of the results.

**Uric Acid in Gout.** C. W. McClure and J. H. Pratt. (*Arch. Int. Med.*, 1917, **20**, 481, through *J. Amer. Med. Assoc.*, 1917, **69**, 1737.) The authors' studies on the intravenous injection of uric acid and the feeding of nuclein containing material, together with the compilations they have made from literature, show that in normal and nongouty as well as in gouty persons there is great variability in the quantity and in the duration of exogenous uric acid excretion. For this reason a diminished or a protracted exogenous uric acid output most probably results from factors other than disturbances in the nuclein intermediary metabolism. If this is not true, then derangements in nuclein metabolism are so common that their importance in the etiology of any diseased condition is problematic. In the majority of gouty persons the uric acid in the blood is more than 3 Mg. per hundred c.c. when determined by the method of Folin and Denis. No relation exists between the amount of uric acid and of total nonprotein nitrogen found in the blood of gouty persons. A marked retention of nonprotein nitrogen is not frequent in gout. The excretion of exogenous uric acid by normal, by arthritic, and by gouty persons varies greatly both in amount and in duration. The retention of exogenous uric acid is regarded as a symptom of questionable importance in the diagnosis of gout.

**Urinary Antisepsis.** F. G. Davis. (*J. Amer. Med. Assoc.*, 1918, **70**, 581.) A large number of substances which have considerable antiseptic action in very dilute aqueous solution lose this property in urine. Numerous experiments are detailed showing this. The value of every drug used for urinary anti-

sepsis should be questioned until its antiseptic action in urine has been proved. Also when administered by the mouth the certainty that it is excreted by the kidneys in an active state should be established.

**Veronal Poisoning, Prevention of.** H a s r u d. (*Ugeskrift for Læger*, 1917, 214, through *Med. Rev.*, 1917, 20, 353.) The incorporation of  $1\frac{1}{2}$  to 2 grains of powdered ipecacuanha with each dose of veronal. This is too small a quantity to be emetic when only one powder is taken, but when an overdose of veronal is attempted vomiting will occur. The chances of poisoning are also diminished by prescribing phenacetin together with the veronal, since a smaller dose of the latter is then required. A typical prescription is: Acid diethylbarbituric, 4 grains; phenacetin, 3 grains; powdered ipecacuanha,  $1\frac{1}{2}$  grain.

**Wassermann Reaction, Influence of Intravenous Injections of Collargol on.** C. P i c a d o. (*Compt. rend. soc. biol.*, 1917, 80, 327-8, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2338.) The influence of intravenous injections of colloidal substances is especially significant because of the essentially colloidal character of the Wassermann reaction. Two injections of 10 c.c. each of electrargol at 24-hour intervals in a subject with syphilitic history and negative Wassermann resulted on the third day in a distinctly positive Wassermann reaction. Similar injection of collargol in a patient with negative Wassermann and without clinical indications of syphilis was followed by a positive test. Similar injection of electrargol in a patient with syphilitic history and positive Wassermann was followed by a negative test. In three other cases similar injections caused no reversal of the reaction. In view of this effect of colloidal Ag solutions caution should be exercised in interpreting Wassermann tests in the case of persons who have recently received medical treatment.

## PHARMACY

### DISPENSING

**Acetylsalicylic Acid, Salol and MgO, Incompatibility of.** (*J. Amer. Med. Assoc.*, 1918, **70**, 410.) The ingredients of the following prescription are incompatible. R. Calcined magnesia, gr. x ; salol, acetylsalicylic acid, āā gr. v.

In the presence of moisture, MgO reacts with acetylsalicylic acid to form magnesium acetylsalicylate. This in the presence of moisture is decomposed by MgO into  $Mg_2C_7H_5O_3$  and  $Mg_2C_2H_3O_2$ . Salol in the presence of moisture and MgO will gradually decompose into  $Mg_2C_7H_5O_3$  and phenol (or magnesium carbolate).

**Ammonia and Flexible Collodion, Dispensing Difficulty with.** (*Drugg. Circ.*, 1917, **61**, 635.) The following prescription has given trouble : Chloral hydrate, tr. iodine, tr. belladonna, tr. arnica, of each 3 drachms ; solution of ammonia, 1 oz. ; flex. collodion, to make 6 oz. The aqueous AmOH is the disturbing factor. Alcoholic AmOH should be used, this being miscible with the collodion. This and the iodine should be first mixed, and then mixed with about  $3\frac{1}{2}$  fluid oz. of flexible collodion. Dissolve the chloral hydrate in the remaining tinctures and gradually add to the collodion solution, shaking after each addition. Finally make up to 6 oz. with flexible collodion.

**Apiol and Powders in Capsules.** (*Pharm. Era*, 1918, **42**, 51.) Difficulty has been found in massing the ingredients of the following prescription, so as to obtain a mass, which when divided will not be unduly bulky for inclusion in a capsule. Apiol, 1 drachm ; ferrous sulphate, 1 drachm ; powdered aloes,  $\frac{1}{2}$  drachm ; powdered myrrh,  $\frac{1}{2}$  drachm. Mix and divide into thirty capsules. It is suggested that the best method is to mass the dry substances by themselves, dividing the mass into the

required number of parts, placing the parts in the capsules and then dropping into each capsule the required amount of apiol.

**Caffeine Citrate and Sodium Salicylate in Mixture.** (*Chem. and Drugg.* 1918, 90, 200.) The following prescription produces a cloudy mixture: Caffein. citrat. gr. xij.; phenazoni; sod. salicylat., āā ʒj.; aq. chlorof. ad ʒvj. The caffeine citrate in presence of water is split into its component parts, caffeine and citric acid; the caffeine enters into a soluble combination with the sodium salicylate, while the free citric acid liberates salicylic acid from part of the sodium salicylate. The liberated salicylic acid, being in excess of what will dissolve in the liquid, remains suspended in it as a snowflake precipitate. If the mixture be desired clear, one of two methods can be followed—that is, an equivalent of caffeine alkaloid (6 grains) may be used instead of the caffeine citrate, or the mixture may be neutralized, or better rendered slightly alkaline. The latter procedure is preferable, as it retains the citrate.

**Calomel and Rhubarb, Incompatibility between.** (*Pharm. Era*, 1917, 50, 282.) It was found that in the following prescription: Calomel, 2 grains; sodium bicarbonate, 2 grains; pepsin, 1 grain; aloin,  $\frac{1}{6}$  grain; powdered rhubarb, 1 grain; podophyllin,  $\frac{1}{6}$  grain; after standing for some time reduction of the HgCl occurred with liberation of metallic Hg. In a series of experiments this was traced to the action of the rhubarb in presence of a trace of moisture. No reduction occurred when the rhubarb was omitted. Since a similar action took place when tannin was substituted for rhubarb, it is inferred that the tannin in that drug is the reducing agent. If all the ingredients in the above mixture are first perfectly dried, then mixed with HgCl and kept in dry stoppered bottles no change will occur. On then introducing a trace of moisture reduction of HgCl takes place in the mixture containing rhubarb, and after 2 or 3 weeks a mirror or globules of Hg will be observed.

**Difficult American Prescriptions.** (*Bull. Pharm.*, 1917, 31, 494.) (1) Pulv. camphorae, 5·00; phenylis salicylatis; acetanilidi, āā 2·00; sacchari lactis, q.s. M. ft. pulv. No. X. Sig.: One every 3 hours. It is better to prevent the camphor and salol from forming a liquid than to absorb it after liquefied. Therefore the camphor was triturated with an equal weight of sugar of milk, and then the salol and acetanilide with 5 Gm.



more of sugar of milk. The two were then gently mixed.

(2) Creosoti, M. iv. M. fiat. chart. No. IV. Sig. : One three times a day. About 8 grains of light magnesium carbonate was used to take up the liquid.

(3) Iodi, gr.  $\frac{1}{2}$ ; glycerini, aquae, gelatini, āā q.s. ad ʒj. M. ft. tales No. XXX. Sig. : Iodine cubes. On inquiry it was learned that gelatin cubes were desired containing the iodine. 250 grains of gelatin were softened in  $12\frac{1}{2}$  drachms of water,  $12\frac{1}{2}$  drachms of glycerin (by weight) added, and heated until the gelatin was melted. Then 2 grains of iodine and 5 grains of KI were dissolved in 50 minims of water, added to the gelatin solution, mixed well, poured into a greased powder-box of large size, and when it had solidified the gelatin mass was cut up into 30 cubes.

(4) Acidi tannici, ʒij.; tinct. ferri chlor., ʒiij.; adipis lanae, petrolati, āā p.e. q.s. ad ʒiij. M. ft. ung. The tincture was mixed with the wool-fat, and the tannic acid separately with the petrolatum, rubbing it smooth; the two were then mixed.

(5) Glycerini, ʒiv.; tinct. ferri citrochlor., ʒij.; acid. phosphorici dil, ʒij.; elix. aromat., ad ʒiv. M. The precipitate formed can be redissolved by adding about 2 drachms of sodium citrate, but if U.S.P. tinct. ferri chlor. be used in place of the citrochloride, no precipitate is formed.

(6) Sodii salicylatis, sodii bicarbonatis, āā ʒiss; tinct. ferri chlorid., ʒij.; aquae, ad ʒiij. The sodium salicylate was dissolved in 2 oz. of distilled water, the tincture added, then cautiously the sodium bicarbonate was added. A deep blood-red solution was obtained.

(7) Mentholis, gr. xv.; chloroformi, ʒj.; tinct. benzoini, ʒjss.; petrolati liquidi, ʒj. M. ft. nebulae. The tincture of benzoin here is a trouble-maker. It will not combine with the liquid petrolatum. Eighteen grains of gum benzoin were dissolved as completely as possible in the  $\text{CHCl}_3$ , the menthol added, then the liquid petrolatum; mixed well, then filtered.

(8) Bismuth. subnit., ʒv.; liq. antiseptic alkaline, ʒvj.; zinci sulphocarbolat., ʒij.; tr. opii deod., ʒiv.; ess. pepsin, ad ʒiv. M. Sig. : Two teaspoonfuls in water every 3 hours. The alkaline antiseptic solution is bad for everything else in the prescription. So it was neutralized with 12 grains of citric acid, when the mixture proved very satisfactory.

(9) Tinct. benzoini, tinct. myrrhae, āā ʒiv.; aquae rosae, ʒiij. M. Sig. : Mouth-wash. The resinous precipitate was

kept suspended in emulsion form by the addition of 2 drachms of tincture of guillaia to  $2\frac{3}{4}$  oz. of rose water before adding the tinctures.

**Dispensing Difficulties.** (*Brit. and Colon. Pharm.*, 1918, 71, 106.) *Ferri et Ammon. Cit. in Capsules*: R Ferri ammon. cit., grs. v.; ft. caps. mitte, xxiv. Sig. i. t.d.s.p.c. A suitable diluent is sugar of milk, in the proportion of two of ingredients to one of diluent.

*Cocaine Hydrochloride and AgNO<sub>3</sub> in Lotion*.—R Argent. nit., grs. x.; cocain. hydroch., grs. xij.; aq. rosae, ad  $\bar{z}$ viii. M. ft. lotio. This prescription presents a double incompatibility: (a) Argent. nit. and cocain. hydrochlor. causing precipitation of AgCl; (b) reduction of the AgNO<sub>3</sub> in solution in an aromatic water. A clear mixture may be dispensed, and should be so, by using cocaine nitrate instead of the hydrochloride (easily made by carefully neutralizing the equivalent weight of alkaloid with HNO<sub>3</sub>), and by the substitution of distilled water for the rose water. To prevent the reduction of the silver salt by the physio-chemical action of light the lotion should be dispensed in an amber-coloured bottle.

**Dispensing Difficulties.** (*Chem. and Drugg.*, 1917, 89, 553.) *Salicylic Acid Lotion*.—Ac. salicylic., gr. c.; S.V.R.,  $\bar{z}$ ij.; glycerin,  $\bar{z}$ ij.; aq. ad  $\bar{z}$ iv. Ft. lotio. On dissolving the acid in the spirit, then adding the glycerin and water, the acid was thrown out of solution. On mixing the rectified spirit, water, and glycerin, placing the salicylic acid in a mortar and powdering it finely, then adding to it gradually, with trituration, the mixed liquids, a clear solution was thus obtained. The salicylic acid thrown out of solution in the lotion prepared by the first method would probably dissolve up in time, but when precipitated in this fashion it is often somewhat refractory to resolution.

*Paraffin Emulsion*.—The following prescription has given trouble: Paraffin liq.,  $\bar{z}$ ij.; ol. amygdal.,  $\mathbb{M}$ xx.; ol. ricini,  $\mathbb{M}$ xx.; ol. limon.,  $\mathbb{M}\frac{1}{4}$ ; salol, gr. x.; sacc. lact., gr. v.; p. acaciae, q.s. gr. 50; aq. ad  $\bar{z}$ ss. Mist. ft. emul. Mitte tales doses xx. In any case, a satisfactory, nice-looking, non-separating emulsion cannot be compounded by the use of acacia only as an emulsifiant. To compound a white creamy emulsion use, in preparing an ounce, 65 grains of gum acacia and 4 or 5 grains of powdered tragacanth should be used. Triturate

these with the salol and sugar of milk, and make a mucilage by addition of the water, then incorporate the oils. It is well to use clean white pieces of gum acacia and powder them: commercial powdered gum acacia is nearly always sour and dusty.

**Ergotin not Soluble in Alcoholic Menstrua.** (*Amer. Drugg.*, 1918, 66, 157.) It has been found impossible to prepare a clear solution in compounding the following prescription: Ergotin, 40 grains; quinine, alkaloid, 32 grains; oil of thyme, 30 min.: alcohol, to make 1 fl. oz. Take fifteen drops in water three times a day. American ergotin is a water soluble extract of ergot and is almost entirely insoluble in strong EtOH and even in partially diluted alcohol. As the prescription stands it is impossible to dispense a clear solution. The ergotin should be triturated with a few drops of water, afterwards adding the alcohol in portions and with constant trituration, then dissolving the oil and the alkaloid in the mixture. This will produce a turbid fluid, but the ergotin remains in suspension, and there is therefore a more accurate division of dose. Possibly Bonjean's ergotin behaves differently from American ergotin, which is the equivalent of the N.F. aqueous extract of ergot, since the French product is made by a different process, which involves the use of alcohol and water in its preparation.

**Ferric Citrochloride Solutions, Changes of Colour with.** W. R. White. (*J. Amer. Pharm. Assoc.*, 1918, 7, 255.) Acids and alkalis beyond certain limits will destroy the green colour of solutions of ferric citrochloride. In solutions of ferric citrochloride, exposed to sunlight, the citric acid is decomposed with the formation of Cl and acetone, and it is probable that the CO<sub>2</sub> liberated combines with the Na, lessening the acidity; the restoration of the colour by the addition of acids indicates this. The iron exists in the green compounds in the ferric state and is reduced to the ferrous in the reddish brown and colourless solutions. Citric acid can be used to lighten solutions and elixirs when of a reddish brown colour, but citric acid and reduced iron should be used together when these preparations have turned black. The green colour is more than likely the result of a new compound of sodium citrochloride and the excess of acids destroys this. An excess of alkali in all probability causes the formation of Fe(OH)<sub>3</sub>, producing a reddish brown colour.

**Incompatible and Unusual Prescriptions.** C. H. La Wall and I. Griffith. (*J. Amer. Pharm. Assoc.*, 1918, **7**, 359.)

(1) Sodium borate,  $1\frac{1}{2}$  drachms; acid salicylic, 1 drachm; glycerin, 10 fluid drachms; syrup to make 4 fl. oz. No matter how this prescription is compounded a chemical change is bound to occur between the sodium borate and the glycerin. Two ways of compounding this prescription suggest themselves. In the first, salicylic acid is dissolved in a very small volume of EtOH and the borax is dissolved in the warmed glycerin. The two solutions are mixed and the syrup then added. A perfectly clear solution results. The other method is to dissolve the salicylic acid in 5 fluid drachms of the glycerin, heated on a water bath and the borax in the rest of the glycerin, also heated. These two solutions are mixed and enough syrup added to measure 4 fl. oz. Both methods produce apparently permanent solutions.

(2) Quinine bisulphate, 2; phenol, 1; glycerin, 4; distilled water, 60. Compounded in any manner, strictly according to this formula, a crystalline precipitate is bound to occur after the product has stood a while. This precipitate or rather tufted masses of crystals, on examination, proved to be alkaloidal quinine. The addition of an excess of an acid which gives soluble salts of quinine prevents the formation of this precipitate. Lactic acid which lately has been frequently and successfully used in the treatment of seborrhoea seems the logical one to use. Addition of this acid inhibits the production of a precipitate, and while no trial was made with the substitution of dilute alcohol for the distilled water, such a change, it would seem, would also prevent this precipitation.

(3) Sodium nitrite, 20 grains; sodium citrate, sodium bromide, of each 2 drachms; compound digestive elixir, to make 3 fl. oz. Various methods were tried, without success, to hasten the decomposition which occurs in this mixture. Effervescence does not cease for 36 to 48 hours. After several days, a nitrate, nitrites, and a precipitate due to the salting out of the digestive ferments occurred. There is no way of overcoming the incompatibility of this.

(4) Sodium salicylate, 2 drachms; hexamine, 1 drachm; spirit of nitrous ether, 2 fluid drachms; water to make 2 fl. oz. This develops a peculiar black colour on standing. If the spirit is acid, crystals may form. The cause of the colour has not been determined.



(5) The bromine sodium salicylate, 2 ; NaI, 4 ; corrosive sublimate, 0.065 ; distilled water, 60. When first dispensed, this forms a clear mixture. On standing for a day a white precipitate, containing theobromine and Hg is formed. Caffeine, in a similar mixture substituted for theobromine, affords a permanently clear mixture which does not precipitate.

(6) Quinine sulphate, 1 ; potassium acetate, 6 ; aromatic sulphuric acid, sufficient ; syrup of lemon to make 90. The potassium acetate was dissolved in half the syrup ; the quinine in the remainder with the aid of a few drops of the acid. On mixing the two solutions, a heavy bulky precipitate of quinine acetate is formed. By substituting simple elixir for the syrup, the amount of precipitate formed is lessened, but not entirely obviated.

(7) Thymol iodide,  $\frac{1}{2}$  drachm ; wool-fat,  $\frac{1}{2}$  oz. ; cotton-seed oil, to make 6 fl. oz. The thymol iodide is dissolved in a portion of the oil : the melted wool-fat, in another portion. When this is cool, the two solutions are mixed. A perfect solution is not attained.

(8) Strychnine sulphate,  $\frac{1}{2}$  grain ; tincture of digitalis,  $\frac{1}{2}$  fl. oz. ; tincture of strophanthus,  $\frac{1}{2}$  fl. oz. This gives at first a turbidity and ultimately a precipitate. This may be partly obviated by using fat-free tinctures.

(9) Glycerin, solution of  $\text{H}_2\text{O}_2$ , of each 2 oz. This has been stated to give an unstable mixture, in which  $\text{H}_2\text{C}_2\text{O}_4$  is gradually formed. This is incorrect. After 5 or 6 months the  $\text{H}_2\text{O}_2$  is found to be quite undecomposed and no trace of  $\text{H}_2\text{C}_2\text{O}_4$  is present.

(10) NaBr, 4 drachms : elixir of pepsin and rennin compound, to make 2 fl. oz. After a few hours turbidity appears, followed by a slimy, gelatinous precipitate. This was not prevented by the addition of acid. It is probably due to salting out of the enzymes. A "shake-the-bottle" label should be used.

(11) Phenacetin, 10 grains ; quinine sulphate, 20 grains ; aromatic sulphuric acid, sufficient ; syrup of citric acid or aromatic elixir, to make 2 fl. oz. There is no incompatibility. The prescription is noted because phenacetin prevents the occurrence of the usual fluorescence of the quinine solution.

(12) Aspirin, 1 drachm ; KI, 1 drachm ; glycerin, 4 fl. drachms ; anise water, to make 4 fl. oz. As one would suspect there is a fairly quick dissociation of the acid radicals of the aspirin in the product of this prescription, due of course to hydrolysis.

The aspirin loses its identity, breaking up into acetic and salicylic acids, the presence of both of which was proven. The fine display of crystals exhibited in the one product as well as the grape-like form of precipitate shown in the other bottle are salicylic acid. Acetic acid and free iodine are present in the supernatant fluid.

(13)  $\text{KMnO}_4$ , 20 grains; phenol, 20 grains; glycerin, 4 drachms; distilled water, to make 2 fl. oz.  $\text{KMnO}_4$  in the presence of glycerin is immediately reduced to  $\text{MnO}_2$  and O is liberated. This nascent oxygen will bring about a change in the composition of the glycerin and the phenol. This change, however, is probably very slow and need not be considered since there is no way of filling this prescription without bringing about the chemical change mentioned. It presents a clear case of an incorrigible incompatibility.

(14) Quinine sulphate, 15 grains; sodium benzoate, 2 drachms; distilled water, to make 3 fl. oz. In the consideration of the proper means of filling this prescription, the use of an acid to assist in the solution of the alkaloidal salt is prohibited since such an addition would only create a new difficulty, that is, the releasing of the insoluble benzoic acid from its combination. In attempting to fill the prescription the benzoate was dissolved in 1 fl. oz. of water and the quinine salt as nearly as possible in the rest of the water. The two portions were then mixed. The result was the precipitation of the very bright crystal masses of quinine benzoate.

(15) Sodium benzoate, 3 drachms; solution of calcium hydroxide, to make 4 fl. oz. Precipitation of the slightly soluble calcium benzoate occurs here and is intensified somewhat the longer the mixture is allowed to stand. There is no way of overcoming this without an impermissible change in the formula. It can be dispensed with a "shake-well" label.

(16)  $\text{SrBr}_2$ ,  $\text{K}_3\text{C}_6\text{H}_5\text{O}_7$ , of each 2 drachms; distilled water, to make 2 fl. oz. Dissolving the  $\text{SrBr}_2$  in a fluid ounce of the water and the potassium salt in the rest of the water, then mixing the two solutions produces a precipitate which soon disappears. Shaking the bottle brings it back immediately, and on standing a while the mixture resembles milk of magnesia. The insoluble precipitate of course is strontium citrate.

(17) Menthol, 8 grains; quinine sulphate, 20 grains; phenol, 24 grains; ichthyol,  $2\frac{1}{2}$  drachms; hydrous wool-fat, 4 drachms; castor oil, 10 fluid drachms. This prescription is reported to

have given various results in the hands of different compounders. As the formula stands there is no way of making a permanently presentable and smooth product. Substituting 15 grains of alkaloid quinine for the salt and melting this with the menthol, phenol and ichthyol and incorporating this mixture with the solution of anhydrous (not the hydrous) wool-fat in the warmed castor oil gives a permanently presentable and non-granular creamy liquid.

**Iodine and Syrup Hypophosph. Co. in Prescription.** J. Halliwell. (*Brit. and Col. Pharm.*, 1918, **72**, 44.) When first dispensed the following prescription gives a diffused brown precipitate: R Calc. iodid,  $\bar{3}$ ss.; tinct. iodi.,  $\bar{5}$ i.; syr. hypophosph. co.,  $\bar{5}$ ij.; aq., ad  $\bar{5}$ iv. This precipitate may be dissolved by gently heating the mixture. It will not reappear when the liquid cools. It also disappears after the unheated mixture has stood for a few days.

**Ointment of Peruvian Balsam, Betanaphthol and Sulphur.** (*Drugg. Circ.*, 1918, **72**, 124.) The following prescription has proved extremely unsatisfactory to compound: Balsam Peruv.,  $\bar{5}$ js.; betanaphthol.,  $\bar{5}$ ij.; sulphur. sub.,  $\bar{5}$ vi.; petrolati, adepi,  $\bar{a}\bar{a}$  ad  $\bar{5}$ iv. The difficulty of dispensing a passable ointment is mainly due to the basis. Much more satisfactory results are obtained by substituting simple ointment U.S.P. (white wax, 1; lard, 4). Rub the sulphur with about half the simple ointment in a warm mortar until a smooth mixture results. Rub the balsam and betanaphthol with a little EtOH (about 1 drachm) until they are dissolved; incorporate it with the remainder of the base and mix with the sulphur ointment. Avoid heat after adding the balsam and sulphur.

**Phenazone, Some Incompatibilities of.** C. Mannich. (*Ph. Praxis: Boll. chim. farm.*, 1917, **56**, 279, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 973.) Phenazone and  $(\text{CH}_2)_6\text{N}_4$  react in the presence of acids (e.g. HCl) to form a crystalline compound which is gradually deposited from solution. This reaction doubtless occurs in the stomach in the presence of the HCl of the gastric juice when phenazone and  $(\text{CH}_2)_6\text{N}_4$  are administered together: these two compounds form an incompatible mixture and the product of the reaction is physiologically inactive. HCHO, phenazone and  $\text{NH}_4\text{Cl}$  also constitute an incompatible mixture owing to the reaction produced; this is

likewise true of phenazone, formaldehyde-ammonia and HCl, the same product being generally obtained in both cases. Phenazone and preparations of HCHO in mixtures should be avoided in prescriptions. Pyrimidone does not participate in the above reaction and remains unchanged in the solution. The compound produced in the reaction has a composition corresponding to  $C_{36}H_{39}O_3N_7HCl$ .

**Pills and Divided Powders, Quantity of Active Material in.** Grönberg. (*Farm. Notisblad*, No. 21; *Schweiz. Apoth. Ztg.*, 1917, **55**, 88.) Trituration experiments with sugar and citric, oxalic and tartaric acids, or sugar,  $CaCO_3$  and  $Na_2CO_3$ , or NaCl,  $Na_2HPO_4$  and  $Na_2SO_4$ , with subsequent solution of the divided powders and titration, show that accuracy of dosage depends on the amount of powder and the time of trituration. Ten powders give more accurate results than 20 or 30. Rubbing for 1 minute only produces varying results; rubbing for 3 minutes more uniform results; mixing for 5 minutes places into each powder practically the accurate quantity of medication. Similar results were obtained in the case of pills.

**Quinine and Potassium Acetate in an Acid Mixture.** (*Drugg. Circ.*, 1918, **62**, 213.) The following prescription has given rise to difficulties, owing to the basic quinine acetate crystallizing out: Magnesium sulphate, 4.0 Gm.; quinine sulphate, 4.0 Gm.; iron sulphate, 0.6 Gm.; potassium acetate, 8.0 Gm.; aromatic sulphuric acid q.s., syrup of orange, 30.0 c.c.; water, to make 180.0 c.c. Basic quinine acetate separates after a few minutes in a bulky gelatinous mass which almost fills the liquid. It is soluble in a large excess of acid, but is precipitated more quickly by a moderate excess. To use enough acid to prevent precipitation or to redissolve the precipitate would make the mixture so excessively acid that it would not be admissible to administer it. The precipitate is soluble in EtOH, and also in glycerin, but to a less extent. It is recommended to omit the aromatic sulphuric acid, and dissolve the quinine sulphate in an ounce of glycerin and an ounce of alcohol, then add the syrup of orange. Dissolve the other salts in enough water to make 3 fl. oz. of solution and add to the quinine mixture. Mix and filter if necessary. A mixture so made has remained clear for 24 hours, while one made by using 2 oz. of glycerin and no alcohol formed crystals of quinine acetate over night.



By using both alcohol and glycerin the alcoholic content is kept low and an apparently permanent solution is obtained. Of course, the physician's consent should be obtained. He might object to the alcohol. If so, 3 oz. of glycerin would probably accomplish the desired result.

**Sodium Acid Phosphate and Sodium Benzoate in Mixture.** (*Chem. and Drugg.*, 1917, 89, 1032.) The following mixture prescribed by a specialist was required to be "perfectly clear like water": Sodii phosph. acid., gr. cclxxx.; sodii benzoat.,  $\bar{5}$ ij.; sodii sulph.,  $\bar{3}$ iss.; aq. anethi ad  $\bar{5}$ viiij. If dispensed as written, a flocculent precipitate will be formed by the liberation of  $\text{HC}_7\text{H}_5\text{O}_2$ . If  $\text{Na}_2\text{HPO}_4$  is used instead of  $\text{NaH}_2\text{PO}_4$ , a clear mixture will result.

**Strontium Bromide and Sodium Benzoate, Incompatibility of.** E. Canals and J. Serre. (*Répertoire*, 1918, 29, 97.) The following two prescriptions have had to be dispensed: (No. 1)  $\text{NaBr}$ , 10 Gm.;  $\text{SrBr}_2$ , 10 Gm.;  $\text{NaC}_7\text{H}_5\text{O}_2$ , 6 Gm.; water, 250 Gm. (No. 2)  $\text{NaBr}$ , 20 Gm.;  $\text{SrBr}_2$ , 20 Gm.;  $\text{NH}_4\text{Br}$ , 20 Gm.;  $\text{NaC}_7\text{H}_5\text{O}_2$ , 12 Gm.; water, 200 Gm. With No. 1, a white precipitate was formed on mixing in the usual way, which was soluble on warming. With No. 2, the precipitate was not soluble in hot water unless the volume of water was doubled. If the salts in the first prescription were dissolved separately, and the solutions mixed, no precipitate was formed, but this did not prevent the formation of a precipitate with the second mixture. It redissolved, however, when warmed; and no precipitate formed if warm solutions were mixed. The precipitate was collected and proved to be  $\text{Sr}(\text{C}_7\text{H}_5\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$ . Its solubility in water was found to be 1 : 25.9 at  $15^\circ\text{C}$ . Although not very soluble, it is hygroscopic, becoming converted into a pasty mass after 2 days' exposure to the air.

**Tar Ointment, Incompatible.** G. Elliot. (*Pharm. J.*, 1917, [4], 45, 263.) On a recent occasion the following prescription was dispensed: R hydrarg. ox. flav., 7 grains; zinci oxidi, 1 drachm; ung. picis liq., 1 oz. Ft. ungt. Sig.: To be well rubbed into the parts night and morning. The  $\text{ZnO}$  and  $\text{HgO}$  were mixed, rubbed down with a little almond oil, and incorporated with the ung. picis liq. The resulting ointment was of a moderately soft consistence, but on standing for an hour set into a hard mass. When broken it very much resembled

Burgundy pitch in consistence and general appearance. This very unusual behaviour for an ointment attracted attention, and an endeavour was made to find out the cause. In such a condition it was quite hopeless to use the ointment in the manner directed.  $\text{ZnO}$  and yellow  $\text{HgO}$  were mixed with *pix liquida* in the proportions existing in the ointment. This paste formed a hard mass in the course of a few hours, showing that chemical combination had taken place, probably between the oxides and the phenolic constituents of the wood tar. The principal constituents of wood tar, according to the B.P.C., are pyrocatechol, phenol, guaiacol, and creosol, with a little acetic acid. Phenol, guaiacol, and creosol were mixed into a soft paste with  $\text{ZnO}$ . In each case the soft paste formed a solid mass in a few hours. No experiment was made with pyrocatechol, which was unobtainable. These experiments indicate that the  $\text{ZnO}$  is hopelessly incompatible with the B.P. tar ointment. Apart from the practical impossibility of applying such an ointment, the soothing and cooling action of the  $\text{ZnO}$  would be lost, and the antiseptic effect of the wood tar considerably diminished. In an endeavour to overcome the difficulty,  $\text{ZnCO}_3$  was substituted for the  $\text{ZnO}$ . This mixture also gradually stiffened, though not so quickly nor quite to the same extent as in the case of the  $\text{ZnO}$ , probably from the fact that the  $\text{ZnCO}_3$  contains a much smaller percentage of metallic Zn. In another endeavour to overcome the difficulty the prescription was dispensed, substituting for *unguentum picis liq.*, B.P. the *unguentum picis molle*, B.P.C., but the resulting product was too hard and tough to be easily rubbed in. The prescription was dispensed with a mixture of 3 parts olive oil and 5 parts tar ointment, when a presentable ointment was obtained.

## GALENICAL PHARMACY

**Aluminium Hydroxide as an Ointment Base.** E. Crouzel. (*Répertoire de Pharm.*, 1917, 28, 258.) It is proposed to substitute moist aluminium hydroxide for vaseline, lanoline, lard and other fatty bases for applications to the skin. Although unctuous to the touch, it is neither greasy nor does it stain the skin or fabrics. It is absolutely without action on the skin or mucous membranes, and is inert both chemically and therapeutically. "Ointments" compounded with it may be packed

in cartons or wood and will not permeate the sides of the container. It shows no signs of change on keeping and obstinately retains its moisture and consistence.

**Ambrine Substitute.** A. E. Robert. (*Lyon chirurg.*, through *L'Union Pharm.*, 1918, 59, 153.) Hard paraffin m.p. 48–49° C., 100; natural gutta-percha, 3. Melt together. To be applied to the cleaned, dried surface of the burn, in a melted condition, by means of a brush. Several successive layers may be put on and covered with a thin dressing of cotton wool, over which more of the melted preparation is spread. (See also *Y.B.*, 1917, 187.)

**Biological Products, Storing in the Pharmacy.** E. W. Oranhood. (*Nat. Drugg.*, 1918, 48, 65.) Experiments with untreated diphtheria antitoxin prove conclusively that the life of the product is greatly prolonged if proper storage conditions are observed. When kept in an ice-box without special precautions there is no loss of potency for over four years, in many cases not for 12 years. It is evident that if these serums are properly protected from heat and light they will preserve their potency for a very long time. It is to be inferred that tetanus antitoxin is subject to like conditions. Most labels call attention to this fact, referring either to diphtheria or tetanus antitoxin: "Keep this product in the dark and at a uniform temperature between 35 and 50 degrees Fahrenheit." It may be inferred that bacterial serums (antipneumococcus, antimeningococcus and antistreptococcus serums) are amenable to practically the same temperature conditions that apply to the diphtheria and tetanus antitoxic serums. As regards bacterial vaccines, a minimum of heat is always used in their manufacture since the immunizing qualities and hence their therapeutic values are destroyed if too much heat is applied in their preparation. Freezing does not seem to be injurious. Therefore, to preserve the potency of bacterial vaccines, keep them at a low temperature, preferably that of a refrigerator. Experiments with vaccine virus have been made to show the rate of deterioration when placed in various temperatures. It was found that at 37° C. (98° F.) vaccine virus lost its potency within 3 or 4 days. At 21° C. (70° F.) the virus was active from 1 to 3 weeks; at 10° C. (50° F.) the product was still good after 3 to 6 months, while at –12° C. (10° F.) it retained its activity for more than 4 years. It is apparent from the above that biological products

should be handled in as careful a manner at least as perishable food stuffs, and the best way to accomplish this is by proper refrigerator facilities.

**Bismuth, Iodoform, and Paraffin Paste.** P. L. Blakely. (*Pharm. J.*, 1917, [4], 45, 167.) The statement has been made that "B.I.P." is sometimes gritty. If prepared as follows it will be found to be perfectly smooth: Iodoform crystals, 8 oz.; bismuth subnit., 8 oz.; paraffin liq.,  $\bar{5}$ v. (fl.) or q.s. The crystal  $\text{CHI}_3$  is powdered finely (the precipitated form is much more liable to become absorbed). The  $\text{BiONO}_3$  is then added and made into a paste with the paraffin, *sec. art.*, avoiding the use of metal spatulas.  $\text{Bi}_2\text{O}_2\text{CO}_3$  should not be used. The patients are dosed with pot. bicarb. gr. xv. t.d.s., if any symptoms of iodoform absorption are recognized. (See also *Y.B.*, 1917, 177.)

**Burns, Formulae employed in Paraffin Treatment of.** A. J. Hull. (*Brit. Med. Journ.*, 1917, 2, 789.) The following formulae are given in addition to those already published (*Y.B.*, 1917, 188). It will be noted that  $\beta$ -naphthol is now substituted for resorcinol in "No. 7 paraffin."

No. 7.—Resublimed beta-naphthol, 0.25; eucalyptus oil, 2; olive oil, 5; vaseline, 25; paraffinum durum, 67.75.

No. 10. *Red.*—Scarlet-red, 0.2; eucalyptus oil, 2; olive oil, 5; adeps lanae hydrosus, 4; paraffinum molle, 21; paraffinum durum, 67.8.

No. 11.—Scarlet-red 0.2 per cent. at expense of paraffin molle. It is difficult to get a good wax which will melt and retain most of the scarlet-red.

No. 12.—Brilliant green, 0.05; eucalyptus oil, 2; olive oil, 5; adeps lanae hydrosus, 4; paraffinum molle, 21; paraffinum durum, 67.95.

No. 13. *Flavine Wax.*—Flavine, 0.2; eucalyptus oil, 2; olive oil, 5; adeps lanae hydrosus, 4; paraffinum molle, 21; paraffinum durum, 67.8.

No. 14.—Dichloramine-T, 0.2; eucalyptus oil, 2; olive oil, 5; paraffinum molle, 25; paraffinum durum, 67.8.

*To make a Kilogram of Paraffin.*—Take 0.5 Gm. of brilliant green or 2 Gm. of scarlet-red or flavine, and 40 Gm. of lanoline, rub the coloured material until a highly-coloured smooth paste is obtained which contains no undisintegrated particles of the dye; using about half an ounce of water assists the solution of the dyes. Melt the paraffinum durum (678 Gm.), and add



210 Gm. of paraffinum molle and 50 c.c. of olive oil. Let the temperature of the resulting mixture sink to at least  $65^{\circ}\text{C}.$ , then stir in the previously prepared lanoline paste, stirring until thoroughly mixed. At about  $55^{\circ}\text{C}.$  add 20 c.c. of eucalyptus oil, stir and allow to solidify. The adeps lanæ hydrosus is used as a suspending and diffusing agent. Smaller quantities do not satisfactorily take up the dyes. Larger quantities are undesirable, as they make the resultant wax less satisfactory to paint on. If the above directions are carefully followed, little of the dye falls out of suspension, although reheating the wax for use tends to make this occur. Unless small quantities of wax are melted at a time, it is advisable to stir the liquid before using. The scarlet-red forms the least satisfactory suspension, and requires stirring while using, but its therapeutic value has caused it to be persevered with. To prepare dichloramine-T paraffin, dissolve the dichloramine-T in eucalyptus oil and add to the other ingredients at  $55^{\circ}\text{C}.$  The dichloramine-T wax has proved an unsatisfactory wax from a practical point of view owing to the tendency to be brittle and adhere to the raw surface of the burn, instead of being easily removed in one piece, as is the case with the other preparations.

**Calomel Oily Injection.** — Durand. (*J. Pharm. Chim.*, 1918, 17, 197.) Calomel, 5 Gm.; guaiacol, 3 Gm.; camphor, 2 Gm.; sterile vaseline, 40 Gm.; sterile vaseline oil, 40 Gm. This makes 100 c.c. Melt the vaseline in a flame-sterilized porcelain capsule, at a gentle heat, and dissolve the camphor and guaiacol therein. Introduce the calomel into a flame-sterilized mortar; slowly add the melted vaseline, then very gradually the liquid vaseline oil, stirring vigorously. This operation should take about 45 minutes. Put up in suitable sterile stoppered bottles. The semi-liquid oil thus obtained will keep perfectly. It contains 0.05 Gm. of  $\text{HgCl}$  in each c.c. Before use, the container should be stood in tepid water at  $30\text{--}40^{\circ}\text{C}.$  If plunged into hot water, separation of the  $\text{HgCl}$  is probable. (See also *Y.B.*, 1917, 253, 261; 1908, 267; and *Gen. Index.*)

**Chloroform Water as a Preservative for Stock Mixtures.** (*Brit. and Colon. Pharm.*, 1917, 71, 394.) Chloroform water, B.P. 1898 (not the weaker preparation of the B.P. 1914), is found to be an efficient preservative when used as a vehicle for ordinary stock mixtures. The only instances in which it has failed to

prevent fermentation are those of mixtures containing a small proportion of syrup and of alcohol. (See also *Y.B.*, 1888, 30 : 1890, 372, 374.)

**Colloidal Solution for Intravenous Injection for Profound Shock, and Toxaemia of Gas Gangrene.** J. Fraser and E. M. Cowell. (*J. Amer. Med. Assoc.*, 1918, 70, 524.)  $\text{CaCl}_2$  (B.P.), 0.075 Gm.;  $\text{NaCl}$ , 1.325 Gm.; gum acacia, 2 Gm.; water, 100 c.c. A double strength solution is conveniently made and kept in sterilized bottles—sterilization should be repeated each week. This solution is made up as follows :  $\text{CaCl}_2$  (B.P.), 13 grains;  $\text{NaCl}$ , 232 grains; gum acacia, 350 grains; water, 1 pint.

**Concentrated Iodotannic Syrup.** — Manseau. (*Bull. Soc. pharm. de Bordeaux; Répertoire Pharm.*, 1917, 28, 260.) Tincture of iodine, 200; tannin, 40; glycerin, 300; simple syrup, 400. Mix and leave in contact at the normal temperature about 20° C. for a month. To 100 Gm. of the product add 900 Gm. of simple syrup to produce iodotannic syrup. (See also *Y.B.*, 1913, 335.)

**Chloretone as a Preservative for Alkaloidal and other Solutions.** F. A. Pockley. (*Medical Journal of Australia, through Australas. J. Pharm.*, 1918, 33, 44.) Chloretone is a suitable preservative for cocaine and other alkaloidal solutions. A 1 : 200 solution of chloretone has the advantage of being simple, easy to prepare, colourless, odourless, cheap, can be used for instillation or subcutaneous injection, and preserves cocaine, homatropine, or any alkaloid used in ophthalmic work, and even the notoriously unstable salts of eserine and pilocarpine for an indefinite period.

**Donovan's Solution, Apparent Deterioration of.** J. Rosin. (*J. Amer. Pharm. Assoc.*, 1917, 6, 951.) When solution of mercurous and arsenous iodide is periodically titrated with N/10 I solution, according to the U.S.P. IX method of assay a steady and very considerable decline in the amount of I used will be observed in the course of twelve months. This is due, not to any loss of As content, but to the change of the As from the arsenous to the arsenic condition. Consequently, no loss of therapeutic potency is indicated, as might be inferred from the results of the official method of assay. The following Gooch Browning method for determining the total As is recom-

mended to substitute the present method of titrating the  $\text{As}_2\text{I}_3$ : Transfer 25 c.c. of the solution into a 500 c.c. Erlenmeyer flask, add 4 c.c. of strong  $\text{H}_2\text{SO}_4$  and 1 Gm. of KI, dilute to about 100 c.c. and gently boil until the volume is reduced to about 40 c.c. or until the solution is of a pale yellow colour. Cool, dilute to about 200 c.c., add a little starch solution and just discharge the blue colour by the addition, drop by drop, of N/10 hypo. Add to the decolourized mixture 20 per cent. NaOH solution until it is slightly alkaline to litmus paper, then make at once slightly acid with dilute  $\text{H}_2\text{SO}_4$ , cool if necessary, then make again alkaline with  $\text{NaHCO}_3$ , and titrate with N/10 I, using starch as indicator.

**Emulsification and Viscosity of Oils.** C. H. Stocking. (*J. Amer. Pharm. Assoc.*, 1917, 6, 952.) The author has observed that, as a rule, there is a definite relation between the viscosity and emulsibility of oils. A better emulsion, containing a higher percentage of oil, is obtained with oil of high viscosity. Castor oil is the only exception observed to this rule, but then its extreme viscosity separates it from all the other oils. By multiplying the percentage of oil in a given emulsion by the viscosity number a figure is obtained which is named the "constant." This "constant" becomes greater as the emulsion approaches the physical ideal. By adjusting the percentage with oils of different viscosities to produce constants that are equal, emulsions practically identical in quality are obtained. Knowing the viscosity of any oil and the constant occurring from the successful emulsification of any possible percentage of the oil, the percentage of any other oil necessary to produce an emulsion of similar quality may be determined by dividing the constant belonging to the oil in the given emulsion by the viscosity of the oil to be emulsified. For example, having a 20 per cent. emulsion of cod liver oil with a viscosity of 9.31 and desiring to make an emulsion of sesame oil of similar appearance and quality, the percentage of sesame oil necessary may be determined by dividing the constant (186.20) of the 20 per cent. cod liver oil emulsion by the viscosity of the sesame oil (10.58).

$$186.20 \div 10.58 = 17.5.$$

Therefore a 17.5 per cent. emulsion of sesame oil having a viscosity of 10.58 is practically the equivalent in quality to a 20 per cent. emulsion of cod liver oil having a viscosity of 9.31. These conclusions apply only to emulsions made by the "Con-

tinental " method, with dry powdered gum acacia 1, oil 2, and water 4, as the emulsifying agents used. (See also *Y.B.*, 1917, 301.)

**Emulsification, Theory of, based on Pharmaceutical Practice.**

W. G. CROCKETT and R. E. OESPER. (*J. Ind. Eng. Chem.*, 1917, 9, 967; *Y.B.*, 1917.) In a previous article the existence of "critical points" of emulsification was pointed out. Depending on the method of determination, these critical values have been defined as either (a) the minimum quantity of emulsifying agent, say acacia, that can produce permanent emulsification of a given quantity of oil in a fixed quantity of water, or (b) the minimum quantity of water that can bring about stable emulsification of a definite quantity of oil by a fixed quantity of emulsifier, say soap. Given standard conditions, these points are quite definite, for while permanent emulsions are produced by these critical amounts, the use of a few milligrams less of emulsifier or of a small fraction of a cubic centimeter of water less than these quantities results in imperfect, temporary emulsification or none at all. Although quantities in excess of the critical value do bring about emulsification, the resulting emulsions do not possess the stability or general excellence of those prepared from the critical proportions. The character of the emulsion depends in no small degree upon the procedure followed in its preparation, and it was found that the emulsifier is most efficiently used when it is hydrated all at one time and in the presence of the internal phase. The previous and further detailed experiments are thus summarized: (I) Critical points have been established using tragacanth and Irish moss as emulsifying agents. (II) Better tragacanth emulsions are obtained by adding the proper amount of water to the previously mixed internal phase and emulsifier and shaking immediately, than by adding the water in portions, shaking after each addition. (III) If the water and critical amount of tragacanth are previously mixed to form a mucilage, and this is shaken with the internal phase no emulsion results. (IV) The critical points are not affected by allowing the dried internal phase to stand in contact with the emulsifying agent before the addition of water. (V) Irish moss emulsions are not affected by small quantities of alcohol, but are instantly cracked by the addition of a trace of soap, whether this be added before the addition of the water or after emulsification has been completed. More



than a trace, however, is not detrimental but aids the Irish moss in producing emulsification. (VI) Glycerin serves to re-emulsify emulsions cracked by soap and emulsions to which glycerin has previously been added are not cracked by a trace of soap. It does not directly aid Irish moss as an emulsifying agent. (VII) Acacia emulsions are not cracked by the addition of a trace of soap. If less than the critical amount of acacia is used, a trace of soap added before the addition of the water supplements the acacia and emulsification ensues; if, however, emulsification is attempted by shaking the internal phase with water and an insufficient quantity of acacia and then adding the soap, it is found that no emulsion is produced—by not only the quantity of soap previously used, but even by many times that quantity. (VIII) Critical points are less distinct with more viscous than with the less viscous oils. (IX) Tragacanth is not suited for the emulsification of fixed oils in water under the foregoing conditions, for it forms a thick, ungovernable mass. (X) Critical points vary with the shape of the container in which the emulsions are made. (See also *Y.B.*, 1917, 301.)

**Emulsions, The Formation and Separation of.** M. H. Fischer and M. O. Hooker. (*Kolloid-Z.*, 18, 129-41, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2062.) A study of emulsions of cottonseed oil in water. There is a difference between the conditions necessary for the preparation of an emulsion and those necessary for its preservation. In pure water a stable emulsion may contain not more than 1 per cent. of oil. For emulsions of higher concentration the oil must be emulsified with a hydrated (hydrophile) colloid, as gum arabic, blood albumin, egg white, egg yolk, casein, aleuronat, gelatin, agar-agar, starch, dextrin, dextrinized starch, soap, concentrated cane sugar solution, glycerol (the first five are best). The water content of the hydrated colloid must be above a certain lower limit, and below an upper limit, in order that the oil may be emulsified. With increasing concentration of oil the viscosity increases. Mixtures can be prepared by this method, which show the properties of solids (e.g. the emulsion of oil in soap solution). If the dispersion medium is so dilute that the water is not all held as a hydrate by the colloid, or if a dehydrating agent is added, the stability of the emulsion is reduced. (See also *Y.B.*, 1917, 301.)

**Emulsions, Water in Oil.** A. U. M. Schlaeffer. (*J.*

*Chem. Soc.*, 1918, **113**, 523.) It is shown that finely divided solid substance which is more easily wetted by the oil than by water will enable emulsions of water in oil to be obtained. The experiments were conducted with pure lampblack, kerosene, and water. When these were mixed in various proportions the water was emulsified in the oil. The water in these was the disperse phase since the emulsion would mix with kerosene, but not with water. In order to obtain these emulsions the order of mixing the ingredients is immaterial. It is noted that carron oil is a water-in-oil emulsion since it mixes freely with organic solvents but not with water. Other oily embrocations are of the oil-in-water type of emulsions.

**Gelatin Capsules, Insolubility of Soft.** F. W. D e r s h e i m e r. (*J. Amer. Med. Assoc.*, 1917, **69**, 1508.) A number of soft gelatin capsules met with in the American market, where they are employed for enclosing such drugs as thymol or chenopodium oil, are found to be very insoluble, much more so than the hard form of gelatin capsules. Two different makes of the soft capsules required to be digested in acid pepsin solution for nearly 4 hours before the contents were liberated. Under similar conditions, the hard capsules opened in 4 minutes. Not only so, but drugs administered in soft capsules have proved to be much less active than the same dose given in hard gelatine capsules. It is suggested that the use of soft gelatin capsules should be abandoned. (See also *Y.B.*, 1906, 130 ; 1915, 247 ; 1916, 343.)

**Gelatin Tannate, Preparation and Uses of.** E. C h o a y. (*J. Pharm. Chim.*, 1917, **16**, 137.) Gelatin 10 is dissolved in water and sterilized, then diluted to nearly 2,000 with more water. Tannin 1:2 is dissolved in water and poured slowly with constant stirring into the gelatin solution. A light white precipitate is formed which is washed by decantation, collected, drained and dried at a low temperature. The odourless, almost tasteless white powder thus obtained is a useful astringent for internal administration for diarrhoea. It is at least equal if not superior to tannalbin and tannogen. For adults, it may be given in cachets each containing 8 grains from 4 to 8 times a day. For children, powders of 4 grains 3 to 6 times daily are a convenient and effective dose.

**Glucose Syrup, War Emergency Substitute for Simple Syrup.** C. P. W i m m e r. (*J. Amer. Pharm. Assoc.*, 1918, **7**, 39.)

It is considered to be more important for pharmaceutical purposes that the glucose substitute syrup should have the same viscosity as cane sugar simple syrup rather than the same specific gravity. The following formula for war emergency syrup which has practically the same sweetening power as simple syrup is therefore proposed: Liquid glucose, 667 c.c.; water, 333 c.c.; saccharin, 1.35 Gm.

**Glycerin, Miscibility of, with Aniline.** I. M. Kolthorff. (*Chem. Weekblad*, 1917, 14, 1081, through *J. Chem. Soc.*, 1918, 14, [1], 63.) At 18° C. glycerin of 89 per cent. strength is miscible with aniline in all proportions, a fact which affords a basis for a method of estimating the proportion of water in glycerin.

**Gum Acacia Solution for Intravenous Injection for Wound Shock.** W. M. Bayliss. (*B.M.J.*, 1918, 1, 553.) Gum acacia, 6; NaCl, 0.9; water to 100. Dissolve, filter through flannel, and sterilize.

**Hyoseyamus Extract, Mixed Inorganic Salts in.** E. van Itallie and W. F. Woutman. (*Pharm. Weekblad*, 1917, 54, 659-70.) On evaporating the chlorophyll-free filtrate in the preparation of henbane extract, a crystalline mass is often obtained. Analysis of the crystals showed 57.9 per cent. of KCl, 31.6 per cent. of KNO<sub>3</sub>, and traces of Al, Fe and Ca as chlorides or nitrates. No organic acid radical was present. The remaining 10.5 per cent. was most probably unremoved extractive. The extract from 40 kilos of leaves yielded more than 500 Gm. of the crystals.

**Isotonic Solutions for Injection.** E. I. van Itallie. (*Pharm. Weekblad*, 1918, 55, 202-8, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 1104.) Commercial solutions for hypodermic injection are not always isotonic. Before using them the freezing point lowering should be determined: from this the amount of NaCl needed to give them the proper freezing point can be calculated. The optimum freezing point is -0.555° C.; but small variations from this are permissible. A table showing the percentage of NaCl required for various alkaloidal solutions is given.

**Iodoform Oil for Injection, Improved Formula for.** — Durand. (*J. Pharm. Chim.*, 1918, 17, 196.) In the original formula given by Paris it is impossible to dissolve completely

the prescribed quantity of  $\text{CHI}_3$ . The following modification of the process affords a preparation which keeps perfectly and contains exactly 0.05 Gm. of  $\text{CHI}_3$  and 0.20 Gm. of  $\text{Et}_2\text{O}$  in each c.c. Crystalline guaiacol in powder, 2 Gm.; creosote, 2 Gm.;  $\text{CHI}_3$ , 5 Gm.;  $\text{Et}_2\text{O}$ , 30 Gm. Shake until complete solution is obtained, then evaporate off 10 Gm. of the  $\text{Et}_2\text{O}$  by plunging the flask in water at 40–50° C. To the residual liquid add pure sterile olive oil, q.s. to make up to 100 c.c. Mix, set aside to deposit, and strain through fine gauze. Put up at once into amber-coloured ampoules of 2 and 5 c.c. capacity. (See also *Y.B.*, 1910, 260; 1913, 246; 1914, 176; and *Gen. Index.*)

**Lead Acetate, Solubility of in Water.** Y. O s a k a and R. H a r a. (*Mem. Coll. Sci., Kyoto*, 1917, 2, 147, through *J. Soc. Chem. Ind.*, 1918, 37, 147A.) The solubility of  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$  in pure water has been found to be 54.38 parts per 100 of water at 25°, 87.77 at 35°, and 154.25 at 45° C.

**Liquor Aluminii Hypochloritis.** R. C. C o w l e y. (*Australas. J. Pharm.*, 1918, 32, 390.) The use of this substance as an antiseptic is by no means new. It was the subject of a patent in the year 1860. It may be prepared as follows: Mix 50 Gm. of bleaching powder with 500 c.c. of water, filter and pass sufficient water through the filter to make up to 500 c.c. Dissolve the exact quantity of  $\text{Al}_2\text{SO}_4 \cdot 18\text{H}_2\text{O}$  in 500 c.c. of water, mix, allow to stand until precipitation is complete, pour off the clear liquid, filter the remainder, and adjust the liquid after titration with alkaline N/10  $\text{As}_2\text{O}_3$  solution to contain 0.5 per cent. w/v of available aluminium hypochlorite. To find the quantity of  $\text{Al}_2\text{SO}_4 \cdot 18\text{H}_2\text{O}$ , determine the amount of N/ $\text{NaCO}_3$  solution required for the complete precipitation of the Al. One c.c. of N/ $\text{Na}_2\text{CO}_3$  = 0.111 Gm. of  $\text{Al}_2\text{SO}_4 \cdot 18\text{H}_2\text{O}$ . This solution does not appear to have been used recently in the treatment of wounds. It is probable that it would prove serviceable.

**Liquorice and Liquorice Extract, Determination of Glycyrrhizin in.** A. L i n z. (*Archiv. Pharm.*, 1916, 254, 65, through *Chem. Abstr. Amer. Chem. Soc.*, 1917, 11, 2131.) The author reviews in all twenty-seven published methods for the determination of glycyrrhizin. Of these only the methods of Parry, Evans, Houseman, and possibly Gadais, are considered to be of practical value. None of the cited methods will produce a



highly purified acid for weighing. In the author's opinion none fulfils the requirements which may be reasonably expected of a quantitative method, excepting of course certain unavoidable errors incident to the determination of glycyrrhizin. The following method is therefore suggested and claimed to give satisfactory results: 5 Gm. of liquorice extract is treated at gentle heat with 50 Gm. of water until the mass is disintegrated, then, on cooling, with 100 c.c. 95 per cent. EtOH, the resulting mixture allowed to settle for 6 hours, filtered and washed on the filter with 50 c.c. 60 per cent. EtOH in small portions at a time. Filtrate and washings are concentrated to 30 c.c., transferred by pouring and washing into a flask, increased to 50 c.c., 5 c.c.  $\text{H}_2\text{SO}_4$  added and allowed to stand first 1 hour at room temperature and 24 hours on ice. The precipitated glycyrrhizic acid is poured on to a filter, washed first with 15 c.c. 2 per cent.  $\text{H}_2\text{SO}_4$  at  $0^\circ$ , followed by 15 c.c. Et<sub>2</sub>O-saturated water at  $0^\circ$ , and the filter dried over  $\text{H}_2\text{SO}_4$ . The filter is thereupon extracted in a flask in rotation with 20, 20, 10, 10 and 10 c.c. hot 95 per cent. EtOH, each portion being then passed through a filter into a tared capsule or dish, the filter washed with 15 c.c. hot EtOH, the united EtOH liquid evaporated at  $100^\circ \text{C}$ . and the residue weighed. The mother liquor (see above) from the glycyrrhizin precipitate is evaporated together with washings after saturation with  $\text{NH}_3$  to a thick syrup, the residue washed into a cylinder, the latter filled to 18 c.c. and 2 c.c. dilute  $\text{H}_2\text{SO}_4$  added. The mixture is allowed to stand 1 hour at room temperature and 24 hours on ice, whereupon the precipitate is transferred to a filter, washed with 5 c.c. 2 per cent.  $\text{H}_2\text{SO}_4$  and 10 c.c. Et<sub>2</sub>O-saturated water at  $0^\circ$ , dried over  $\text{H}_2\text{SO}_4$ , then the filter extracted in rotation with 10, 10 and 5 c.c. hot 95 per cent. EtOH, and the extractions filtered as obtained. The filter is washed with 5 c.c. hot EtOH, the alcoholic liquids evaporated and the residue dried at  $100^\circ$ . The weight of this residue together with that of glycyrrhizic acid obtained above gives the glycyrrhizin content in 5 Gm. of extract. Baracco liquorice yielded with this procedure 9.98–10.55 per cent. glycyrrhizin. *Determination of Glycyrrhizic Acid in Liquorice Root.*—Of the two procedures susceptible of consideration in this connection, namely those of Tschirch and Erikson and of Houseman, only the latter is applicable. In the event of a high purity of the acid it appears to yield quantitative results. It seems advisable to employ absolute EtOH in the first extraction.

adding thereto a few drops of  $\text{NH}_3$  in order to fix the free glycyrrhizic acid and thereby render the latter insoluble in absolute EtOH. (See also *Y.B.*, 1900, 194; 1911, 173, 175, 176, 178; 1912, 175; 1913, 201; 1914, 241.)

**Lotio Alba, Improved.** (*Amer. Drugg.*, 1918, 66, 154.) Sulphurated potash, 2 drachms; gelatin, 20 grains; rose water, 2 fl. oz. Dissolve the gelatin in the gently heated rose water and dissolve the sulphur potash in the solution, afterwards filtering.

Zinc sulphate, 2 drachms; gelatin, 20 grains; rose water, 2 fl. oz. Dissolve the zinc salt in the gelatin solution.

Pour the  $\text{ZnSO}_4$  solution into the other solution, in a fine steady stream and with constant stirring. A fine suspension of the  $\text{ZnS}$  results much more active than when otherwise prepared. The compound lotion is made by adding to the above 1 drachm of levigated  $\text{ZnO}$  and replacing a half-ounce of the rose water with an equal volume of spirit of camphor, which is added at the end of the process.

**Magnesia Magma.** Bertha Mueller. (*Amer. J. Pharm.*, 1917, 89, 309.) The following is stated to be an improvement on the official U.S.P. and other formulæ:  $\text{MgSO}_4$ , dried, 270.0;  $\text{NaOH}$ , U.S.P., 120.0; distilled water to make 1000.0. Dissolve the  $\text{MgSO}_4$  in enough water to make 750 c.c. and filter; dissolve the  $\text{NaOH}$  in enough of water to make 250 c.c.; filter. Pour the  $\text{NaOH}$  solution into the  $\text{MgSO}_4$  solution; mix well, and bring up to 4000 c.c. with distilled water. Wash by decantation, bringing up the volume each time to 4000 c.c. Continue washing until the supernatant liquor, when tested with  $\text{BaCl}_2$ , does not show more than traces of sulphate. When assayed by the official method, the magma contains not less than 6.5 per cent. nor more than 7.5 per cent. of  $\text{Mg}(\text{OH})_2$ . (See also *Y.B.*, 1904, 201; 1908, 300; 1911, 333; 1914, 243; 1916, 417.)

**Magnesium Sulphate, Palatable Mixtures for Administering.** J. Diner. (*J. Amer. Pharm. Assoc.*, 1918, 7, 150.) (1) Magnesium sulphate, 30.00 Gm.; aromatic sulphuric acid, 8.00 c.c.; water, 60.00 c.c.; glycerin to make 120.00 c.c. Dose: One tablespoonful. (2) Magnesium sulphate, 30.00 Gm.; fresh orange juice, 30.00 c.c.; water, 60.00 c.c.; glycerin to make 120.00 c.c. Dose: One teaspoonful. (3) Magnesium sulphate, 30.00 Gm.; tincture cardamom comp., 10.00 c.c.; citric acid,

1.00 Gm.: water, 60.00 c.c.; glycerin to make 120.00 c.c.  
Dose: One teaspoonful. (4) Magnesium sulphate, 30.00 Gm.; citric acid, 1.00 Gm.; syrup sarsaparilla comp., 60.00 c.c.; water to make 120.00 c.c. Dose: One teaspoonful.

Carlton suggests the following mode of prescribing magnesium sulphate: Magnesium sulphate, 1000.00 Gm.; fluid extract cardamom comp., 30.00 c.c.; vanillin, 1.50 Gm.; garatose, 16.00 Gm.; alcohol, 16.00 c.c.; glycerin, 60.00 c.c.; coffee (roasted and ground), 60.00 Gm.; water to make 2000.00 c.c.  
*Directions:* Stir the ground coffee in 2000 c.c. of boiling water, let stand 10 to 20 minutes. While hot add the  $MgSO_4$  and stir until dissolved. Dissolve the vanillin in the alcohol, add the glycerin and fluid extract, and mix with the magnesium sulphate solution; when cold add the garatose, filter and bring up to the volume by addition of water. Thirty c.c. contain 15 Gm. of  $MgSO_4$ .

**Male Fern Extract, Determination of Crude Filicin and Filicic Acid in.** — Perrin. (*Annales Chim. analyt.*, 1918, **23**, 55.)

It is important before drawing the sample that care should be taken to ensure the homogeneity of the bulk. Filicin is normally slowly deposited on the bottom of the bottle, when the extract is stored. Before weighing off the sample, the bulk should therefore be gently warmed and well shaken. *Determination of Crude Filicin.*—Five Gm. is then taken, dissolved in 50 c.c. of  $Et_2O$  and shaken for 5 minutes with exactly 100 c.c. of 3 : 100 solution of  $Ba(OH)_2$  in a separator. After 10 minutes' contact (longer would cause decomposition of a part of the filicin) the aqueous portion is run off and filtered. To 86 Gm. of the filtrate in a beaker sufficient  $HCl$  is added to give a faintly acid reaction. This acid liquid is transferred to a separator, then rinsing out the beaker with several washings of  $Et_2O$ , making 40 c.c. in all. This serves for the first shaking out of the filicin, and is followed by extractions with 30, 20 and 15 c.c. of  $Et_2O$  respectively. The bulked  $Et_2O$  extracts are distilled in a tared flask and the residue is dried at  $100^\circ C.$  to constancy. The weight  $\times 25$  gives the percentage of crude filicin. *Determination of Filicic Acid.*—The mere determination of crude filicin is not sufficient in the valuation of male fern extract. The filicic acid must also be assayed since samples may contain a full amount of filicin acid yet be very deficient in filicic acid, which is the more important active agent. To determine the acid the dried residue of the filicin determina-

tion is left in contact with 2 c.c. of amyl alcohol for 24 hours, with occasional agitation, the flask being well corked. After this period, 20 c.c. of pure MeOH is added, drop by drop. The first addition produces a precipitate which redissolves. The addition is then continued until a permanent precipitate occurs, which will be when about 10 drops have been added. The rest of the MeOH is added all at once; after agitation, the mixture is set aside for 24 hours in a cool place. The precipitate is then collected on a tared filter, and drained as thoroughly as possible. Some of the precipitate will adhere to the sides of the flask. This is washed twice with 5 c.c. of pure MeOH, which is then passed through the filter. The filter is first exposed for 2 hours to the air, then dried together with the tared flask containing the adherent precipitate, at 100° C. to constancy. The weight  $\times 25$  gives the percentage of filicic acid. The amount of crude filicin in the extract should be from 24 to 25 per cent. It shows but little seasonal variation. The amount of filicic acid should be from 3.5 to 9 per cent., according to the time of year the male fern has been gathered. It is higher in autumn than in the spring. (See also *Y.B.*, 1916, 377; 1917, 201, 281.)

**Manna and Glycerin for Soft Mass Pills.** W. M a s k e, j u n. (*J. Amer. Pharm. Assoc.*, 1917, 6, 1058.) Pills which keep permanently plastic are claimed to have advantages. It is found that pill masses which will retain their plastic consistence for over a year may be made with manna and glycerin as excipients. The following are stated to give ideal soft pill masses: *Formula I*—Manna, 1 part; glycyrrhiza, 1 part; glycerin, q.s. *Formula II*—Manna, 2 parts; yellow dextrin, 5 parts; glycerin, q.s.

**Masticol Substitute for Dressing Wounds.** (*Schweiz. Apoth. Zeit.*, 1917, 55, 479.) Rosin, 300; Venice turpentine, 20; castor oil, 10; benzene, 700;  $\text{NaHCO}_3$ , 60; amyl acetate, 5. Dissolve the resins and oils in the benzene and amyl acetate. Add the  $\text{NaHCO}_3$  and set aside with frequent agitation for several days. Finally decant from the insoluble deposit.

**Mercury Benzoate and its Injections, Preparation of.** A. C h r i s t i a e n s. (*L'Union pharm.*, 1917, 58, 338.) The official method for preparing mercuric benzoate of the French Codex is criticized. This salt should not be dried, as there



directed, at  $100^{\circ}\text{C}$ . Exposed to a temperature above  $40\text{--}50^{\circ}\text{C}$ ., it turns yellow and decreases in solubility. If dried at all, this should be done *in vacuo* at a low temperature. The amount of sodium benzoate prescribed in the official formula is insufficient. To precipitate the 10 Gm. of  $\text{HgO}$  dissolved in  $\text{HC}_2\text{H}_3\text{O}_2$  will require 15 instead of 14 Gm. of  $\text{NaC}_7\text{H}_5\text{O}_2$ . The amount of glacial  $\text{HC}_2\text{H}_3\text{O}_2$  ordered to dissolve the  $\text{HgO}$  is too great. For this purpose 5.55 Gm., or at the most 6 Gm., is sufficient, not 10 Gm. as given. Since  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$  is practically insoluble in water, there is no reason why the moist precipitate should not be dissolved at once in the  $\text{NaCl}$  solution to form the injection, calculating the strength of the latter on the basis of the  $\text{HgO}$  taken, and checking the result by titration. This will avoid the objectionable and unnecessary drying of the  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$ . The official formula would then be amended as follows: Yellow  $\text{HgO}$ , 10 Gm.; glacial  $\text{HC}_2\text{H}_3\text{O}_2$ , 5.55 Gm.; distilled water, 100 Gm.; dissolve.  $\text{NaC}_7\text{H}_5\text{O}_2$ , 15 Gm.; distilled water, 300 Gm.; dissolve. Pour the  $\text{NaC}_7\text{H}_5\text{O}_2$  solution into the  $\text{Hg}(\text{C}_2\text{H}_3\text{O}_2)_2$ . If precipitation is not complete, add a little more  $\text{NaC}_7\text{H}_5\text{O}_2$ . Wash by decantation until the washings are neutral. Drain the precipitate, which will be equivalent to 21.15 Gm. of dry  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$ . The Codex infers that  $\text{NaC}_7\text{H}_5\text{O}_2$  solution is the solvent to be used in preparing the injection, since it states that a 1 : 10 aqueous solution of that salt will dissolve easily  $\frac{1}{100}$  of its weight of  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$ .  $\text{NaCl}$  solution is, however, a better solvent; a 1 : 100 solution for injection is thus prepared:  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$ , 1 Gm.;  $\text{NaCl}$ , 2.5 Gm.; distilled water to 100 c.c. The whole of the above moist precipitate, equivalent to 21.15 Gm. of  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$ , may be thus dissolved in this 2.5 : 100 solution of  $\text{NaCl}$  so as to produce a 1 : 100 injection. The strength of the solution thus obtained should be checked, either by titration by Deniges' method, or gravimetrically by precipitating the  $\text{Hg}$  as  $\text{HgS}$ . The weight of  $\text{HgS}$  obtained after washing and drying  $\times 0.862$  gives the equivalent of  $\text{Hg}$ ; or  $\times 0.931$  that of  $\text{HgO}$ . The above quantities will give approximately 1 litre of liquid, when standardized to 1 : 100 of  $\text{Hg}(\text{C}_7\text{H}_5\text{O}_2)_2$ . (See also *Y.B.*, 1913, 338; 1915, 250; 1917, 171; and *Gen. Index*.)

**Mercury Ortho - amido - benzoate.** L. Bory and A. Jacquot. (*L'Union pharm.*, 1918, 16.) This new mercuric salt is obtained by double decomposition by precipitating a

solution of  $\text{Hg}(\text{C}_2\text{H}_3\text{O}_2)_2$  with sodium ortho-amido-benzoate. The salmon-coloured precipitate thus obtained is washed until the washings are neutral, and then dissolved in a solution of  $\text{NaCl}$ . It requires 3 Gm. of  $\text{NaCl}$  to dissolve 1 Gm. of the amido benzoate, which is therefore much less soluble in saline solution than mercuric benzoate. It is also twice as toxic to rabbits as the latter. It is considered that further experiments will prove that the new salt has considerable therapeutic value. It is stated that doses of 4 to 6 centigrammes have been administered without any ill effects.

**Neutral Olive Oil, Preparation of.** A. Astruc and J. Cambe (*J. Pharm. Chim.*, 1917, **16**, 241); P. Le Naour (*ibid.*, 243). Astruc and Cambe advocate the following method: The amount of free acid in the oil is determined in a  $\text{Et}_2\text{O}$ - $\text{EtOH}$  solution. Then 1 litre of the oil is taken and mixed with 250 c.c. of  $\text{Et}_2\text{O}$  and 250 c.c. of  $\text{EtOH}$  95 per cent. The necessary amount of  $\text{NaOH}$  to neutralize the acidity of this mixture is then dissolved in 500 c.c. of water. This solution is then vigorously shaken up with the oily mixture in a separator for 10 minutes. After repose, the lower  $\text{EtOH}$ -water liquid is run off, taking with it the soap of the free fatty acid. The  $\text{Et}_2\text{O}$  is recovered by distillation, or evaporated on the water bath, and the oil is finally heated to  $115^\circ \text{C}$ . over the naked flame and filtered.  $\text{KOH}$  may be used to neutralize the free fatty acid. In this case, the final filtration must be performed with the perfectly cold oil. Le Naour determines the amount of free acid, dissolves the requisite quantity of  $\text{Na}_2\text{CO}_3$  to neutralize this in a given amount of oil, in  $\frac{1}{10}$  its weight of water at  $40^\circ \text{C}$ . The oil is warmed to the same temperature, and the  $\text{Na}_2\text{CO}_3$  solution added to it. The mixture is thoroughly agitated several successive times, then set aside to cool. When quite cold the neutral oil is decanted. When oils of good quality are used, it is not necessary to determine the acidity. Excess of the  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  solution, sufficient to neutralize 3 per cent. of oleic acid may be used.

**Ointment Bases.** — Jaudon. (*Répertoire*, 1917, **28**, 194.) It is considered that the irritation sometimes caused by certain ointments is due, not to the active ingredients, but to the base which may have been used in its preparation. The author considers that sufficient attention is not given to this matter by pharmacists, and deplors the almost universal adoption of

soft paraffin as an ointment base. Lard, especially the prepared and benzoated lard made by the pharmacist himself, which had been the general ointment basis for so long, is certainly preferable in many instances. Probably lard owes its disrepute to the fact that ordinary commercial bladder lard had, in later times, usurped the place of the true pharmaceutical prepared lard. Proceeding to discuss the official ointments the following bases are recommended: For  $\text{CHI}_3$ ,  $\text{HgCl}_2$ , phenol, and salol ointments, a basis of lanoline 8 and vaseline 2, or 9 : 1, according to the season, should be used. The drug should be rubbed down first with a few drops of oil of sweet almonds. The ointments of  $\text{HgO}$ , red and yellow,  $\text{ZnO}$  and  $\text{NH}_2\text{HgCl}$  should be made with benzoated lard to which a little stearin may be added in summer. Wax should not be used. For the same oxides as precipitates cucumber ointment is the best basis and is very soothing to irritable and sensitive surfaces, such as those of the eye. It is suggested that cucumber ointment should be specifically prescribed as the basis for eye ointments. For the French official boric acid ointment (the basis of which is vaseline alone) from 10 to 20 per cent. of hard paraffin is necessary in summer. In *Pommade antipsorrique* (containing S and  $\text{K}_2\text{CO}_3$  with a lard and poppy-seed basis) the substitution of  $\text{H}_2\text{O}_2$ , 10 vols., for the water prescribed causes the preparation to keep better. For belladonna ointment, the extract should be softened with water (instead of glycerin as in the Codex directions). Then the softened extract is rubbed down with an amount of oil equal to the water used. This smooth mixture is then incorporated with benzoated lard. For ointments of camphor, tar,  $\text{CHCl}_3$ , KI and I, and other ointments which require to be hardened in summer, purified tallow is better than the wax generally used. In mercurial ointment, a basis of purified tallow 1 and lard 2 is preferable to lard alone.

**Ointment Basis, Hydrogenated Cotton-seed Oil in.** E. R. Jones. (*J. Amer. Pharm. Assoc.*, 1918, 7, 525.) When combined with a little white beeswax, hydrogenated cotton-seed oil is found to afford a satisfactory substitute for lard. Zinc ointment prepared with a basis of hydrogenated cotton-seed oil 27, and white beeswax 5, melted together, is satisfactory, and will keep for 2 years. The proportion of wax may be altered as required.

**Ointment Bases, Water Absorbing Power of.** (*Michigan*

*Druggist*, through *Bull. Pharm.*, 1918, **32**, 215.) The following list will aid in the selection of a proper basis for various medicinal agents in ointments. The figures indicate the amount of water or aqueous fluids which can be absorbed by 100 parts of the ointment base : Lard, 15 ; benzoinated lard, 17 ; lard with 5 per cent. glycerin, 10 ; lard with 2 per cent. resin, 22 ; lard with 10 per cent. vaseline, 4 ; simple ointment, 40 ; simple cerate, 40 ; cold cream, 50 ; petrolatum, 10 ; petrolatum with 5 per cent. yellow wax, 65 ; hydrous lanoline, 200 ; anhydrous lanoline, 300.

**Ointments, Certain, Methods of Manipulating.** H. Russell (*Merck's Report*, through *Bull. Pharm.*, 1918, **32**, 214.) *Camphor and Chloral Hydrate Ointment*.—Camphor, 2 drachms ; hydrated chloral, 2 drachms ; petrolatum, to make 1 oz. The camphor and chloral should be rubbed together in a mortar until completely liquefied and the petrolatum then incorporated. This makes a smooth ointment.

*Mercuric Chloride Ointment*.—Hydrargyri chloridi corrosivi, 3 grains ; ung. petrolati, 1 oz. This is prepared by first dissolving the  $\text{HgCl}_2$  in a small quantity of  $\text{EtOH}$ , mixing this with about a drachm of some fixed oil (preferably castor oil) and finally incorporating with the petrolatum.

*Thymol Iodide Ointment*.—Dissolve the thymol iodide in a small quantity of  $\text{Et}_2\text{O}$  and mix this with about one-fifth of the petrolatum ; warm on a water bath to expel the  $\text{Et}_2\text{O}$ , and then add the remainder of the petrolatum.

**Ointments, Prepared Lard and Purified Butter as Bases for.** P. Carles. (*Répertoire*, 1917, **18**, 228.) The author fully agrees with Jaudon as to the superiority of prepared lard over the hydrocarbon bases at present widely used as ointment bases. The reason that lard has lost its popularity is due solely to the fact that it has been found to become rancid with age. This is only because the lard is not properly purified. Good hog flare cut up in small pieces should be melted with a little water at a gentle heat, strained through a cloth, and set aside to set for several hours. The solid fat is then turned out and the lower portion scraped off, to remove the grosser impurities. The remainder is again gently melted and stirred up with a little water, then again set aside for several hours until set. This process is repeated twice more. After the final melting the liquid fat is filtered through paper in a hot



water funnel, conveniently into half-pound pots. It will keep for several years without any alteration and forms an ideal basis for all ordinary ointments.

For eye ointments, fresh butter, similarly purified and treated, is the best basis. Mercuric oxide ointment made therewith keeps perfectly and is a remarkable non-irritant.

**Ophthalmic Preparations, Pharmacy of.** C. E. H o f f m a n n. (*Amer. J. Pharm.*, 1917, **89**, 296.) The following are among some formulae specially devised for ophthalmic work.

*Glycerite of Boroglycerin 60 per cent.*—Boroglycerin, 60 ; glycerin, to make 100. Heat the boroglycerin with glycerin 60 in a tared dish between 150–160° C. until the weight is 100.

*Ointment of Glycerite of Boroglycerin.*—Glycerite of boroglycerin, 20 Gm. ; borax, 2 Gm. ; spermaceti, 20 Gm. ; white wax, 20 Gm. ; oil of sweet almond, 38 Gm. To the spermaceti and white wax which have been melted add the oil of sweet almond and continue the heat to a temperature of 80° C. To the glycerite of boroglycerin add the borax and bring to a temperature of 120° C. and continue until all the borax has been dissolved. Add the mixture of the glycerite of boroglycerin and sodium borate to the oil mixture and stir rapidly and continuously until the ointment congeals and becomes of a uniform consistence. This ointment is very hygroscopic and must be placed immediately in sealed tin tubes or air-tight containers.

*Ointment of Citrate of Copper in Glycerite of Boroglycerin.*—Copper citrate, 8 ; glycerite of boroglycerin, 80 ; wool-fat, 2 ; white petrolatum, 10. Heat the glycerite of boroglycerin to 125° C. and slowly add the copper citrate and continue the heat until all the latter has dissolved. Remove the heat and when the mixture has cooled to 75° C. add the wool fat and white petrolatum ; stir constantly until it has cooled to 50° C. and transfer to air-tight containers.

*Ophthalmic Iodoform Ointment.*—CHI<sub>3</sub> in finest powder, 1 ; white petrolatum, 9. Heat a porcelain mortar to 60° C., and triturate therein the CHI<sub>3</sub> with a small portion of the basis. Then add the rest, and stir until it congeals.

*Cassaripe Ointment.*—Cassaripe, 1 ; white petrolatum, 9. Heat the cassaripe to 60° C. Add the basis slowly and triturate until the ointment congeals.

*Ophthalmic Corrosive Sublimate Ointment.*—HgCl<sub>2</sub>, 1 ; NaCl, 1 ; distilled water, 5 ; wool-fat, 20 ; white petrolatum to 5000.

Dissolve the  $\text{HgCl}_2$  and  $\text{NaCl}$  in the water: add the wool-fat and petrolatum. Mix intimately.

*Ointment of Yellow Mercuric Oxide.*—Precipitated yellow  $\text{HgO}$ , 1; white petrolatum, 99. In a porcelain mortar which has been heated to  $60^\circ \text{C}$ . place the  $\text{HgO}$  and triturate with the white petrolatum, the latter a little at a time until completely incorporated. The finished product must be absolutely free from any visible particles of  $\text{HgO}$ , even when a thin film is spread upon clear glass.

*Ophthalmic Alkaline Antiseptic Solution.*—Camphor, thymol, of each 0.54 Gm.;  $\text{NaCl}$ ,  $\text{NaC}_7\text{H}_5\text{O}_2$ , of each 5.40 Gm.;  $\text{NaHCO}_3$ , 11.00 Gm.; oil of spearmint, 0.60 Gm.; oil of eucalyptus, oil of pine needles, of each 0.90 Gm.; alcohol, 10.00 Gm.; glycerin, 27.00 Gm.; water, to make 1000 Gm. This solution will have a sp.g. of from 1.0185 to 1.0190. The  $\text{EtOH}$  strength is reduced to a minimum so as to lessen the irritating effects.

*Formaldehyde Preserving Jelly for Ophthalmic Specimens.*—Gelatin, 1 oz.; formaldehyde solution, 2 drachms; egg albumin,  $\frac{1}{2}$  oz.; glycerin, 8 oz.; water, 20 oz. Break the gelatin into small pieces and allow it to soak in 12 oz. of water for 10 hours, then transfer to a porcelain vessel, add the egg albumin and the remaining 8 oz. of water and the glycerin; heat until all of the egg albumin has coagulated, allow to simmer for 10 minutes, filter, and while still liquefied but cooled to  $60^\circ \text{C}$ ., add the solution of formaldehyde and allow to congeal. For preserving a specimen the jelly having been carefully heated to liquefaction only is poured over the specimen and the container sealed.

**Oxygen, Compressed, for Medicinal Purposes.** T. A d a m s o n. (*J. Amer. Med. Assoc.*, 1917, 68, 1621.) The large industrial demand for  $\text{O}$  to be used in the  $\text{O-C}_2\text{H}_2$  flame for welding and cutting has led to a great reduction in the cost and an improvement in its quality, as  $\text{O}$  prepared from liquid air or the electrolysis of water is 98 per cent. pure, while the U.S.P. requirement is only 95 per cent. The following tentative specifications for compressed  $\text{O}$  are suggested: Compressed  $\text{O}$  shall contain at least 98 per cent. of  $\text{O}$  by volume. It shall give no coloration when 2 litres are bubbled through a solution of  $\text{KI}$  and starch, at the rate of 4 litres per hour. It shall be delivered in steel cylinders which shall have been manufactured and tested in accordance with the regulations, and the date of the test

shall be plainly legible. The capacity of the containers shall be certified by a recognized testing laboratory. The pressure of each cylinder shall be tested immediately on delivery and shall register at least 1800 pounds per sq. in. Cylinders registering less than 1800 pounds at the time of delivery shall be rejected. When O is to be used in laboratories for determinations of heat of combustion or for organic analysis, the following additional requirement shall be made : The gas shall contain no H or other combustible matter.

**Paraffin and Rosin Dressing for Burns.** — Chassevant. (*L'Union pharm.*, 1918, 60, 17.) The following mass is at least as efficacious as the semi-proprietary preparations put forward recently for spraying in the molten state on to the surface of burns : Rosin, 5 ; hard paraffin, 1 ; beeswax, 1. If these proportions are considered to give a too hard product, the amount of beeswax used may be doubled. The spray may be applied when the temperature of the melted liquid is as high as 70° C. without occasioning any pain. It solidifies when applied thus at 45° C., forming a strong adherent covering over the burned surface. (See also *Y.B.*, 1917, 172, 187.)

**Petroleum Emulsion.** M. H. Spimer. (*Nat. Drugg.*, 1918, 48, 65.) Soft Paraffin, 40 Gm. ; liquid paraffin, 200 Gm. ; powdered acacia, 60 Gm. ; syrup, 50 c.c. ; Jamaica rum, 50 c.c. ; water, to make 500 c.c. (See also *Y.B.*, 1905, 277, 278 ; 1906, 127 ; 1915, 272 ; 1916, 350 ; 1917, 307.)

**Picric Acid Solution for Wounds.** T. F. Broon. (*J. Royal Army Med. Corps*, 1917, 28, 722, through *Chem. Abstr.*, *Amer. Chem. Soc.*, 1918, 12, 69.) Picric acid 1 : 100 solution is recommended for dressing superficial wounds, for syringing suppurating sinuses and fractures and crushed tissues. It kills bacteria without a corroding effect and prevents suppuration, stimulates granulation of tissues, has marked anodyne properties, is less irritating and more efficacious than I, may be used for sterilization of the skin in surgical cases and shortens the convalescent period.

**Pill Masses, Rate of Disintegration of, with Various Excipients.** W. Maske, jun. (*J. Amer. Pharm. Assoc.*, 1918, 6, 1059.) Pills made with different excipients were immersed in vials containing artificial gastric secretion and placed in a mechanical agitator, the temperature being maintained constantly at 37°.

The pills used were in each case about 6 weeks old, so that they had time to harden. The following times of disintegration are the averages of four experiments with each pill mass of ingredients named. (1) Starch; syrup of glucose, q.s.: 4 minutes. (2) Yellow dextrin, 5 parts; manna, 1 part; glycerin, q.s.: 7 minutes. (3) Yellow dextrin, 5 parts; manna, 2 parts; glycerin, q.s.: 8 minutes. (4) White dextrin, 5 parts; manna, 2 parts; glycerin, q.s.: 8 minutes. (5) Yellow dextrin, 5 parts; manna, 1 part; glycerin, q.s.:  $10\frac{1}{4}$  minutes. (6) Yellow dextrin, 5 parts; manna, 2 parts; water, q.s.:  $10\frac{3}{4}$  minutes. (7) Althaea; confection of rose, q.s.:  $11\frac{1}{4}$  minutes. (8) White dextrin, 5 parts; manna, 1 part; water, q.s.: 12 minutes. (9) Althaea; syrup of glucose, q.s.:  $12\frac{3}{4}$  minutes. (10) Glycyrrhiza; confection of rose, q.s.: 14 minutes. (11) Glycyrrhiza, 1 part; manna, 1 part; glycerin, q.s.:  $17\frac{1}{2}$  minutes. (12) Blaud's pill:  $18\frac{1}{4}$  minutes. (13) Blaud's pill: 19 minutes. (14) Glycyrrhiza; syrup of glucose, q.s.:  $19\frac{1}{4}$  minutes. (15) Acacia, 1 part; althaea, 2 parts; water, q.s.:  $26\frac{3}{4}$  minutes. (16) Starch; glycerite of tragacanth, q.s.:  $37\frac{3}{4}$  minutes. (17) Althaea; syrup, q.s.:  $39\frac{1}{2}$  minutes. (18) Glycyrrhiza; syrup, q.s.:  $44\frac{1}{4}$  minutes. (19) Soap, 1 part; glycyrrhiza, 2 parts; water, q.s.:  $53\frac{1}{4}$  minutes. (20) Soap, 1 part; althaea, 1 part; water, q.s.: 1 hour  $23\frac{3}{4}$  minutes. (21) Althaea; glycerite of tragacanth, q.s.: 1 hour  $27\frac{3}{4}$  minutes. (22) Acacia; water, q.s.: 1 hour  $28\frac{1}{4}$  minutes. (23) Acacia, 1 part; tragacanth, 1 part; water, q.s.: 3-hours  $48\frac{3}{4}$  minutes. (24) Tragacanth; water, q.s.: 7 hours  $3\frac{1}{2}$  minutes. (25) Kaolin; petrolatum, q.s.: Not disintegrated at the end of 8 hours.

**Pharmaceutical Laboratory Work.** H. Rodwell. (*Pharm. J.*, 1918, [4], 46, 13.) *Useful Apparatus.*—The old-fashioned large two-handed marble mortar, the pestle of which is fitted with a stout six-foot shaft, is a form of extreme utility, worthy of more general use instead of the large single-handed kind. Its wide range of usefulness, and the thoroughness of the work effected by its means, renders it the most excellent of all pharmaceutical tools. Both mortar and head of pestle should be of marble. The mortar, having an inside diameter of from 12 to 18 inches, should be sunk deeply into a wooden or brick base, or otherwise firmly seated. From the wall or ceiling, and fixed centrally over the mortar, is an iron-ringed staple, through the ring of which passes loosely the upper end of the shaft of the



pestle. The mortar should be arranged at such a height from the floor that full force can be applied when the pestle is gripped just above the head. A diameter of 16 inches is strongly recommended.

Another essential is a large-calibre metal mortar, again of the two-handed type. A metal mortar, to be of real service, should have an inside diameter, measured across the top, of 16 inches, with a pestle weighing some 36 lb., which should be suspended from a bracket by means of stout rubber cords. It is necessary to have this piece fixed on the ground. A full set of brass-meshed sieves of the following numbers : 10, 20, 30, 40, 60, and 80, are also necessary. These should be about 14 inches in diameter, and should have wooden rims. A useful form, especially for smaller operations, is a nest of metal-rimmed sieves some 9 inches in diameter, of the same numbers. These should be fitted with a metal receiver. A drying cupboard is also indispensable. In deciding the question of the size of the cupboard it is necessary to take into account the bulky nature of vegetable drugs, especially of leaves.

*Granulation for Tablets.*—The marble pestle and mortar is of the greatest use in the preparation of granules for tablet-making. From 1 to 4 lb. of mixed powders can be moistened in a few minutes, and at a single operation, with a thoroughness that is quite impossible by the use of the ordinary type. The powder is so evenly moistened that it passes through the sieve without choking the mesh, and free from fine powder. A No. 20 sieve has been found most suitable for granules intended for tablets of 2 grains or more in weight ; when smaller than this, a No. 30 is preferable.

*Mixing and Sifting Powders.*—Mixing large quantities of powders demands the utmost care. The method of mixing, then sifting, and finally mixing lightly in a mortar, is probably the best. The final mixing, whether in a mortar or by other means, must never be omitted. It should be fully realized that the process of sifting is to some extent one of separation. A well-mixed compound powder becomes more or less unmixed by passing it through a sieve. The ingredients of a compound powder should be, as nearly as possible, of the same degree of fineness. No operation would appear to be more simple than that of sifting. None is, in general, so ill performed. When sifting involves rubbing with the hand or other similar means, it is a distinct advantage to use the sieve with the narrow rim

upwards. The operation is thus facilitated and a receptacle is at the same time provided for the portion which passes through. The method is seen to good advantage in preparing granules for tablet-making, the object being to avoid crushing the granules. The chief fault to be avoided in sifting dry powders is shaking the sieve in such a way that the surface portion of powder is put into violent motion while that in contact with the mesh moves with the sieve. This may be the result of overloading: more often it is due to the manner of shaking. The best movement, if the sieve must be shaken, is to grasp it on each side by the under rim. With the left wrist held stiff and the right wrist loose, the sieve is moved fairly rapidly in small circles, with an eccentric motion pivoting on the left hand. A very little practice gives facility. It will be found in every way superior to the "to and fro" motion.

*Comminution.*—There are few drugs which cannot, after a short preliminary drying, be reduced sufficiently for most purposes in one or other of the mortars recommended. It should be realized in powdering vegetable drugs that the portion which is most easily powdered—represented by the finer particles, which are, of course, the first to pass through the sieve—is often, from a medicinal point of view, the most valuable. The operation should, therefore, be performed lightly and with care in the first stages, in order to conserve this fraction.

*Trituration of Powder with Liquids.*—In trituration of small quantities of powders with liquids, there is not the same need for care in judging the proportion of liquid to be added in the first place as when working on a larger scale. When once the most suitable proportion has been determined, it should be noted in the formula for use on future occasions. The official *Hydrarg. oleatum* furnishes a first-rate example. There the quantity of liquid paraffin necessary for effective trituration has been determined with the greatest care—a point that is much appreciated when larger quantities are being handled. The practice is found most useful, also, in making ointments. Whether trituration of the powders is with the melted or unmelted base, the first addition is a matter of the utmost importance. Neglect in this particular may lead to a lumpy condition of the product that is irreparable.

*Percolation.*—In the 1914 Pharmacopœia the form of percolation is left to the discretion of the pharmacist, but in the earlier edition it was laid down that the cylindrical percolator should be

"of such dimensions as to present to the menstruum a column of solid materials at least six times as high as wide." In the case of the conical form, "the lower diameter should be not less than one-half the upper diameter." In making small quantities the ratios are not unsuitable, but need not apply when these are much exceeded. Indeed, the figures of the ratio may approach one another the larger the quantity of material worked upon. To maintain the ratio 6 : 1 in larger percolation would render the operation of packing difficult and unsatisfactory. If it is desired to obtain a highly concentrated percolate, the height of the column of solid materials in proportion to diameter must be increased. This is officially and reasonably effected by resorting to the process of repercolation.

*The Making of Solutions.*—The method of making solutions by circulatory displacement, by suspending the solid in the upper part of the solvent, is in common practice, but the advantage of crystals over powder for this purpose is not always realized. Substances in powder dissolve less rapidly than crystals from the fact that the solvent can act only on the outside, circulation through the mass being prevented. Ammonium carbonate, for example, even in half-pound pieces, dissolves surprisingly quickly. The preparation of ammonium carbonate solution in this way, using a container that prevents loss of ammonia, and in which adjustment to the final volume can be done, leaves nothing to be desired. A further point to notice is that solutions from the powdered material are, as a rule, less bright than those made by direct solution of the crystals. Stock-solutions can with advantage be made in this way. More frequently, however, the more direct method of stirring solid and solvent together has to be resorted to. If a pound of citric acid crystals are to be dissolved, the usual method is to place in a mortar and to roughly powder them. This would be energy well expended if it were done thoroughly; but if some of the larger crystals have eluded the pestle the time required for complete solution will have been lengthened instead of shortened. This will be the case especially if the finished solution approaches the point of saturation. Evenness in the size of crystals is an advantage in making solutions.

**Quinine Injections.** R. Dalimier. (*Med. Press*, 1918, 156, 372.) The injectable solutions of basic hydrochloride of quinine at present in general use are the following :—

*For Subcutaneous Administration :* (A) Hydrochloride of quinine, 8 Gm. ; urethane, 4 Gm. ; water, q.s. 20 c.c. 1 c.c. contains 40 Cgm. of the salt (military formula). (B) *Laveran's Formula :* Hydrochloride of quinine, 6 Gm. ; antipyrine, 4 Gm. ; water, q.s. 20 c.c. 1 c.c. contains 30 Cgm. of the salt (military and Codex formula).

*For Intravenous Injection* (Bacelli and Lenzmann) : Hydrochloride of quinine, 1 Gm. ; chloride of sodium, 0 gr. 0.75 ; water, 10 c.c. 1 c.c. contains 10 Cgm. of the salt.

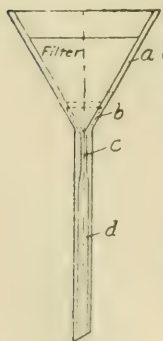
The idea that has pervaded in devising these formulae was assuredly to get the largest possible quantity of quinine into the smallest possible volume. In practice these solutions have proved to present various more or less important drawbacks : Crystallization in the ampoules, the necessity to warm the ampoule before injecting its contents, sharp pain, necrosis of tissue at the site of injection, indurations of the vein wall, etc. Consequently most observers have found themselves constrained to sacrifice the advantages of small volume in order to obtain better tolerance by diluting the solutions. Carnot and de Kerdrel, for intravenous administration, advise diluting the quinine-urethane solution with normal saline solution so as to obtain preparations varying from 2 per cent. to 0.80 or 1.60 per thousand. Laveran dilutes his hypodermic solution of quinine-antipyrine as follows : Hydrochloride of quinine, 50 Cgm. ; antipyrine, 30 Cgm. ; distilled water, 4 c.c., thus reducing to 1 in 8 the proportion of the alkaloid. Abrami, who administers the drug subcutaneously, makes use of the two following solutions : (1) Hydrochloride of quinine, 10 Gm. ; antipyrine, 1 Gm. 50 ; distilled water, 200 c.c. (2) Hydrochloride of quinine, 10 gr. ; urethane, 3 gr. ; distilled water, 200 c.c.

*Isotonic Quinine Hydrochloride Injection.*—Basic hydrochloride of quinine, 40 Cgm. ; NaCl, 4.3 Cgm. ; distilled water, 10 c.c., gives a solution 4 per cent. in an isotonic medium, which is stable above 15° C., and contains a sufficient amount of hydrochloride of quinine for medical purposes (40 Cgm. for 10 c.c., 80 Cgm. for 20 c.c., and so on). It does away with the employment of chemical substances utilized solely for the purpose of increasing the solubility, as is the case with antipyrine and urethane, which are absolutely useless, because unnecessary, when the dilution exceeds 1 in 25. For subcutaneous or intramuscular administration it should be injected just as it is. Owing to the dilution of the salt of quinine it is well borne,



causes very little pain, and does not give rise to any violent local reaction. If we require to administer strong doses all that is necessary is to repeat the injections. Abrami, who makes use of a 5 per cent. solution, sees no objection to injecting 30 c.c. morning and evening in order to reach the daily 3 Gm. that has yielded him such striking results in primary malaria. The 4 per cent. solution described above only requires 7.5 c.c. more to reach the same total. Independently of these circumstances, which regard the sterilization of the malaria in the first period, there will be no occasion to administer such large doses, and the type solution becomes easier to handle. For intravenous injections it may also be employed in this form, but it is preferable to dilute it with normal saline solution, because solutions of hydrochloride of quinine give rise to induration of the vein walls, the more so the stronger the solution. In the proportion of 1 per cent. induration may occur now and then, so that every advantage attends a still higher dilution.

**Reclus's Ointment, Modified Formula.** H. Pied. (*Bull. Med.*, through *L'Union pharm.*, 1918, 59, 39.) The author omits certain useless toxic or irritant ingredients from this popular antiseptic ointment whereby its healing and antiseptic properties are claimed to be greatly increased. The improved formula is: Phenol, salicylic acid, of each 1; resorcinol, 2; powdered camphor, phenazone, of each 5; Peruvian balsam, 6; vaseline, 81. Dissolve the phenol, salicylic acid, resorcinol and camphor by the aid of a little EtOH or glycerin. Dissolve the phenazone in a small amount of water. Mix the Peruvian balsam with the vaseline, then incorporate these solutions. (See also *Y.B.*, 1906, 151.)



**Rapidly Filtering Funnel.** K. Wagmann and J. Pfeiffer. (*Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 644.) The inner surface of the funnel is recessed adjacent to the stem, which latter is capillary for a short distance from the small end of the funnel proper, the inner diameter of the stem being enlarged from this capillary section to the delivery end. The cone-shaped recess *b* of the funnel *a* narrows gradually into a capillary section *c* of the stem *d*, which then gradually opens out into the normal stem bore. As a result, any air

bubbles forming during or at the beginning of the filtration pass through the constricted section *c* and out through the stem. The recess *b* is ground in glass, or pressed in funnels of other material. The funnel is patented in Germany.

**Rectal Feeding, Prescriptions for Injections for.** E. E. Cornwall. (*J. Amer. Med. Assoc.*, 1918, **70**, 1451.) *Prescription 1 for Rectal Feeding.*—This prescription supplies daily 20 Gm. of protein, presumably in the form of amino-acids, fuel of the value of about 700 calories, salts and vitamins, and water to the amount of about 50 oz. At 6 a.m., a mixture, consisting of glucose, 1 oz.; strained juice of one-half orange;  $\text{NaHCO}_3$ , 30 grains;  $\text{NaCl}$ , 30 grains, and water, to make 10 oz., is injected. At 8 a.m., 5 oz. of skimmed milk, thoroughly peptonized and pancreatized, are injected. At noon, the same as at 8 a.m. At 4 p.m., the same as at 6 a.m. At 6 p.m., the same as at 8 a.m. At 10 p.m., the same as at 6 a.m. At midnight, the same as at 8 a.m. Every second day, at 4 a.m., a colonic irrigation with physiological sodium  $\text{NaCl}$  is given, and the glucose enema at 6 a.m. is omitted. *Modifications of Prescription 1.*—The quantity of the glucose enemas may be reduced to 8 oz. The amount of the glucose in the glucose enemas may be reduced to one-half or two-thirds ounce. The amount of the glucose enemas may be increased to 12 or 16 ounces with or without an increase in the percentage of glucose. A quarter of an ounce of glucose may be added to each milk enema. The glucose enemas may be omitted altogether, with or without substitution of drink enemas of physiological  $\text{NaCl}$  solution.  $\text{CaCl}_2$ , 5 grains, may be added to each glucose or drink enema. A culture of acidophilic bacteria may be added to any of the enemas as specified.

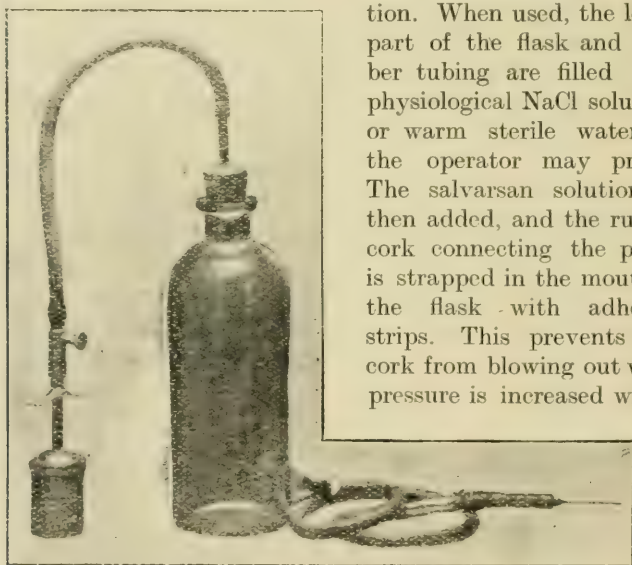
*Prescription 2 for Rectal Feeding.*—This prescription supplies daily fuel to the amount of about 700 calories, salts and vitamins, and water to the amount of 60 oz., but no protein. At 6 a.m., a mixture, consisting of glucose, 1 oz.; the strained juice of one-half orange;  $\text{NaHCO}_3$ , 30 grains;  $\text{NaCl}$ , 30 grains, and water to make 10 oz., is injected. At 10 a.m., the same as at 6 a.m. At 2 p.m., the same as at 6 a.m. At 6 p.m., the same as at 6 a.m. At 10 p.m., the same as at 6 a.m. At 2 a.m., the same as at 6 a.m. *Modifications of Prescription 2.*—The same modifications may be made of the enemas in this prescription as of the similar glucose enemas in Prescription 1. The  $\text{NaHCO}_3$  in the enemas may be increased, even to 60 grains. The orange

juice may be temporarily omitted.  $\text{CaCl}_2$  may be added to the enemas.

The enemas should be introduced at a temperature of  $100^\circ \text{F.}$ , and slowly; the patient's buttocks should be elevated, and he should lie on his right side for an hour after the injections.

**Salvarsan, Simple, yet Efficient Apparatus.** B. N. Wade. (*J. Amer. Med. Assoc.*, 1918, 70, 378.) The apparatus consists of an ordinary aspirating flask, Faught blood-pressure apparatus pump, rubber cork, tubing, and glass connections, as shown in

the accompanying illustration. When used, the lower part of the flask and rubber tubing are filled with physiological  $\text{NaCl}$  solution, or warm sterile water, as the operator may prefer. The salvarsan solution is then added, and the rubber cork connecting the pump is strapped in the mouth of the flask with adhesive strips. This prevents the cork from blowing out when pressure is increased within



Salvarsan apparatus, consisting of Faught blood-pressure pump, ordinary aspirating flask and glass connections, and rubber tubing.

the flask. The solution is kept from flowing out of the tubing by the clamping of the latter with an artery forceps. The salvarsan is then given intravenously in the usual way. Pressure can be added and the solution can be given either slowly or rapidly, according to the wish of the operator. The escape valve of the pump allows the pressure to be diminished when this is desired. This sample apparatus has been used by the author, with satisfactory results, for 2 years.

**Serum, Beef, Normal, for Treatment of Wounds.** J. Leary. (*Boston Med. Surg. Journ.*, 1917, [18], 611, 618, 622, through *J. Amer. Med. Assoc.*, 1917, **69**, 1827.) A series of papers written in conjunction with numerous collaborators. Normal serum may be accepted as a natural physiological solution, readily miscible with the tissue secretions, and bland in its action, apart from certain toxic and anaphylactic properties, now regarded as useful under proper control; it possesses natural antibacterial properties; it is the storehouse of the specified antibodies; it contains ferments capable of digesting tissue detritus and exhibiting other useful activities; it is employed successfully in controlling haemorrhage other than that form (rhexis) requiring mechanical control; it is fitted to serve as a culture medium for tissue; it is able to excite the protective machinery in a non-specific manner, useful in therapy; it provokes a desirable leucocytosis, valuable in the treatment of infections. The results obtained in a variety of cases show that serum will control a septic process, wherever contact is made between the serum dressing and the infected tissue. It is absolutely harmless to normal tissue. As a prophylactic agent in fresh wounds it is of value. Serum is a most marked stimulant of granulations. Grafting can and should be practised earlier following the use of serum than under any other agent. Injections of unheated beef serum are followed by rises in temperature, usually slight, perhaps with chill, but the reactions are short and not severe. Used as a dressing to wounds, no matter how large the surfaces are, it gives rise to no anaphylactic response.

**Sodium Phosphate, Crystalline, Solubility of, in EtOH.** (*Murford's Lab. Notes, Drugg. Circ.*, 1918, **62**, [App.], 25.) The U.S.P. statement that  $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$  is insoluble in EtOH 95 per cent. is incorrect. It is soluble to the extent of 0.11 Gm. in 100 c.c.  $\text{Na}_2\text{HPO}_4$  is much less soluble: only to the extent of 0.006 Gm. in 100 c.c. of EtOH 95 per cent.

**Solidified Alcohol.** T. Nogier. (*Presse Med.*, *J. Amer. Med. Assoc.*, 1917, **69**, 946.) Many forms of "solidified" alcohol have been introduced into commerce. The following gives a very satisfactory article: Dry scraped Castile soap 150, and shellac 12, are added to methylated spirit 500. The mixture is warmed on the water bath until solution is complete, then poured into moulds. It sets when cold. The block thus



formed lights when touched with a match. It is specially useful for heating food and water in the trenches, and is valuable for cleaning the hands and the field of operation in surgical work.

**Spirit of Nitrous Ether, Suggestions for Keeping.** T. C. N. Broeksmitt. (*Pharm. Weekblad*, 1917, 54, 1051.) Unneutralized spirit of nitrous ether contains free  $\text{HNO}_3$ . On neutralizing and filtering, the salts formed pass into the filtrate. The neutralized spirit may be preserved in small bottles by adding a large crystal of  $\text{Na}_2\text{SO}_3$  to each. This causes no contamination, even after prolonged contact. In bulk, spirit of nitrous ether should be kept in the dark in a cool place, and be kept neutral by adding excess of  $\text{MgCO}_3$ . The supply for retail should be filtered off from this as required, and kept by means of the  $\text{Na}_2\text{SO}_3$  crystal as mentioned above.

**Starch Iodide, Colloidal, Preparation of, for Antiseptic Dressings.** E. Gautrelet. (*L'Union pharm.*, 1918, 59, 117.) Starch, 25 Gm., is suspended in a litre of distilled water and heated to about  $35^\circ\text{C}$ . Pure  $\text{NaOH}$ , 2.5 Gm., is then added, and the liquid is kept boiling, with almost constant agitation, for 45 minutes. The heat is then withdrawn, and when the temperature of the starch solution has reached  $80^\circ\text{C}$ . I, 7 Gm., is added gradually, and the solution is stirred constantly until it is cold. The liquid is then made up to 1 litre with cold water and strained through a fine cloth. The colloidal starch iodide thus obtained is precipitated from the solution by means of  $\text{EtOH}$ , 95 per cent. It then forms a bluish-black powder, soluble in water. The above quantities and temperatures must be observed exactly. If the starch and  $\text{NaOH}$  are not boiled long enough, the former is not properly hydrated, and is not soluble. If the iodine is added at a temperature above  $80^\circ\text{C}$ . a clear blue liquid is obtained in which the starch iodide is in a permanently soluble condition. If the temperature is too low  $\text{NaIO}$  and  $\text{NaIO}_3$  are formed and the blue liquid speedily becomes colourless. If the quantities are not precisely observed, other reactions will occur. The colloidal starch iodide thus prepared has given excellent results when employed in solution for the discontinuous irrigation of wounds. It is also used for compresses, dressings and a general antiseptic.

**Sugarless Effervescent.** (*Chem. and Drugg.*, 1918, 90, 311.) The following recipes were devised by Professor John Attfield some years ago:—

*Sodii Citro-Tartras Effervescentis sine Saccharo* (So-called *Citrate of Magnesia*).—Sodium bicarbonate, 17 oz.; tartaric acid, 9 oz.; citric acid, 6 oz.; saccharin, 8 grains. Mix the powders thoroughly, place them in a dish or pan of suitable form heated to between 200° and 220° F., and when the particles of the powder begin to aggregate stir them assiduously until they assume a granular form; then by means of suitable sieves separate the granules of uniform and most convenient size and preserve the preparation in well-closed bottles. The usual dose of this saccharinated preparation is one to two small teaspoonfuls, it being somewhat stronger than the article containing sugar. The formula given above would in the ordinary way include 5 oz. of sugar, and part at least of this bulk may be made up by employing dried  $\text{Na}_2\text{SO}_4$ , but as this increases the activity of the preparation the dose is best kept at the quantity stated above. For summer trade the following are useful:—

*Ginger Beer Powders.* (A) Ginger in powder, 60 grains; sodium bicarbonate, 300 grains; saccharin, 4 grains; oil of lemon, 8 minims. Mix thoroughly. Divide into twelve equal portions, wrapping each in blue paper. (B) Tartaric acid (in powder), 360 grains. Divide into twelve equal portions, wrapping each in white paper. Directions for use: Mix the contents of a blue packet with a tumblerful of water; add the contents of a white packet; stir, and drink during effervescence.

*Lemonade Powders.*—(A) Sodium bicarbonate, 300 grains; saccharin, 4 grains; oil of lemon, 15 minims. Mix thoroughly. Divide into twelve portions, wrapping each in blue paper. (B) Tartaric acid (in powder), 360 grains. Divide into twelve equal portions, wrapping each in white paper. Directions: As for ginger-beer powders.

*Sherbet.*—Sodium bicarbonate, 5 oz.; tartaric acid, 5 oz.; saccharin, 24 grains. Dry the bicarbonate and acid separately. Mix the saccharin with the dry bicarbonate, and add oil of lemon, 60 minims. Add the tartaric acid and mix. Preserve the sherbet in a dry, well-corked bottle.

**Surgical Dressings, Reclaiming.** (*J. Amer. Med. Assoc.*, 1918, 70, 594.) At the Pennsylvania Hospital, Philadelphia, 65 per cent. of the surgical dressings used in that institution are reclaimed. Instead of the 200,000 yards of gauze that would have been required in a year, only 55,000 yards were used. The soiled dressings after being collected in paper bags at the bedside

or dressing-room are taken to the laundry and transferred to net bags and placed to soak in cold water, the water being changed three or four times a day. The next day the net bags are transferred to the sterilizing washer and put through the following steps : two cold water washes without soap or alkali for 10 minutes each ; 45 minutes washing in hot water and soap solution ; two rinsings in hot water for 10 minutes each ; after a small amount of hot water is placed in the washer the cylinder is run for 45 minutes under steam pressure of 12 pounds ; after being put through the extractor they are taken while moist to the gauze-room, where they are stretched, trimmed and prepared for final sterilization.

**Syrup, Ferri Iodid., Ferrum Redactum for making.** F. H. Alcock. (*Pharm. J.*, 1918, [4], 46, 97.) The substitution of reduced iron for iron wire is recommended as being more convenient in practice for the preparation of  $\text{FeI}_2$ .

**Thymol, Solubility of, in Mixtures of Water and Glycerin.** M. Marquina. (*Anal. Fis. Quim.*, 1917, 15, 262, through *J. Chem. Soc.*, 1917, 12, [1], 689.) At  $25^\circ\text{C}$ ., 100 parts of water dissolve 0.0952 part of thymol, and 100 parts of glycerin 1.71 parts of thymol. For mixtures of the two solvents, the solubility of thymol increases with the percentage of glycerin.

**Tolu and Sugar Coating for Granules and Tablets.** B. Fantus (*J. Amer. Pharm. Assoc.*, 1918, 7, 248.) The drug to be coated is coarsely powdered or granulated to No. 40 powder, and moistened with a suitable quantity of a 1 : 2 per cent. solution of tolu balsam in EtOH. It is then immediately thrown upon powdered sugar on a coarse mesh sieve, No. 20, and rubbed through. It is thus converted into granules and coated with sugar. By repeating the process several times, mixing the granules gently without trituration, a considerable diminution of the taste of the drug is effected. The taste-disguising power is increased by the use of saccharin. The following is the "*Saccharinated Solution of Tolu*" employed : Tolu balsam, 2 ; saccharin, 2 ; EtOH 95 per cent., 100. In addition to these sweetened tolu coated granules, sweet tablets may also be prepared. For the administration of the salicylic acid in a pleasant form the following preparation is recommended in place of acetylsalicylic acid and the other salicylates. *Sweet Tablets of Calcium Salicylate* : Calcium salicylate, granular,

6 Gm. : saccharinated solution of tolu, 3 c.c. ; white fat sugar,\* 24 Gm. Pour the Tolu solution over the calcium salicylate. Stir without pressure until the granules are evenly moistened. Add them to the fat sugar and pass the mixture repeatedly through a sieve. Compress in a tablet machine, using a  $\frac{3}{8}$  inch die and punches to make 100 0.30 Gm. tablets. Each tablet will contain 0.06 Gm. (1 grain) of calcium salicylate.

*Sweet Tolu Coated Tablets of Senna.*—Senna, No. 40 powder, 6.00 Gm. ; saccharinated solution of tolu, 6.00 c.c. : red fat sugar,† 24.00 Gm.

The following formula for 0.03 Gm. ( $\frac{1}{2}$  grain) ipecac. tablets might be considered emetic for children, expectorant for adult. Tablets of one-tenth the strength would give a sufficient dose for expectorant action in children, 3 years of age.

*Sweet Tablets of Ipecac.*—0.03 Gm. ( $\frac{1}{2}$  grain) ; ipecac., No. 40 powder, 3.00 Gm. ; saccharinated solution of Tolu, 3.00 c.c. ; cacao sugar,‡ 27.00 Gm. Process of preparation same as specified in first formula.

*Sweet Tablets of Digitalis.*—Improved formula, 0.008 Gm. ( $\frac{1}{8}$  grain) ; digitalis, 40 powder, 0.80 Gm. : saccharinated solution of Tolu, 1.60 c.c. ; cacao sugar, 29.20 Gm. Preparation same as before described.

**Unguentum Aquae Rosae, B.P.** G. Elliot. (*Pharm. J.*, 1917, [4], 45, 283.) Unguentum aquae rosae is rarely ordered in prescriptions by itself, but is frequently prescribed as an emollient basis for the application of medicaments such as salicylic acid, resorcin, ammoniated mercury, oleate of mercury, calomel, zinc oxide, precipitated sulphur, etc. Unguentum aquae rosae, B.P., 1914, gives a distinct alkaline reaction with litmus paper, and an ointment basis ought to be neutral. This

\* *White Fat Sugar.*—This is prepared as follows : Spirit of peppermint, 2 c.c. ; fat starch, 20 Gm. ; powdered sugar, 80 Gm. Add the starch and the spirit to the sugar. Mix. *Fat Starch.*—Alcoholic solution of saccharin 3 : 100, 15 c.c. ; liquid paraffin, 25 Gm. ; starch, 75 Gm. Mix the starch with the saccharin solution and allow the EtOH to evaporate. Then incorporate the petroleum.

† *Red Fat Sugar* is prepared as follows : Solution of carmine, N.F., 6.00 mls ; spirit of cinnamon, 10 per cent., 1.00 c.c. ; fat starch, 20.00 Gm. ; sugar, powdered, 80.00 Gm. Mix the carmine solution with the sugar and permit the powder to dry. Then add the spirit of cinnamon. Preserve in well-stoppered bottle in a dark place.

‡ *Cacao Sugar.*—Spirit of cinnamon, 10 per cent., 0.50 c.c. ; cacao powder, 10.00 Gm. ; dextrose, 10.00 Gm. ; sugar, powdered, 80.00 Gm. Mix thoroughly by trituration in a mortar, and preserve in a well-stoppered bottle.



is especially so in an ointment containing a large percentage of water which facilitates any possible chemical change. Owing to the comparatively feeble acidic properties of boric acid, salicylic acid readily enters into combination with borax, forming a solution containing probably sodium salicylate. Resorcin is also readily acted on by borax. Ammoniated mercury with borax gives off free  $\text{NH}_3$  even in the cold, and much more readily if warmed.  $\text{HgCl}$  with borax reacts with formation of black  $\text{Hg}_2\text{O}$ . A similar reaction takes place with oleate of mercury, giving  $\text{HgO}$ , which, owing to the darkening of the ointment, appears to be further reduced. In all probability prescribers do not realize that the new ointment basis contains borax, which neutralizes salicylic acid, and may react chemically with various other medicaments. It is suggested, therefore, that borax should be omitted from the B.P. formula, leaving the percentage of water at 20. The official formula for ceratum galeni in the French Codex does not contain borax. Nevertheless, it frequently happens that the ceratum galeni in common use, which is a more or less indefinite compound, contains this salt. Care should be taken when Galen's cerate is prescribed with other substances that a borax-free preparation is dispensed. (See also *Y.B.*, 1913, 368 : 1915, 348 : 1917, 297.)

### PHARMACOPŒIA REVISION NOTES.

**Aconite and its Preparations, The B.P. Assay of.** N. P. Millard. (*Pharm. J.*, 1918, [4], 45, 291.) The B.P. directs that the tincture and liniment of aconite be assayed according to the method given under the heading "Aconite Root," but omits to state that the calculations are in all three instances different. The factor given, multiplied by the number of c.c. of  $\text{N}/20$   $\text{H}_2\text{SO}_4$  neutralized by the alkaloids gives the percentage of  $\text{Et}_2\text{O}$ -soluble alkaloids in the powdered root, but is 10 times too much for the tincture and 1.5 times too much for the liniment. It would, therefore, conduce to greater clearness if the last sentence under "Aconite Root" read: "Each millilitre of acid neutralized by the alkaloids corresponds to 0.03217 Gm. of the  $\text{Et}_2\text{O}$ -soluble alkaloids of aconite root." (See also *Y.B.*, 1916, 272.)

**Benzoated Lard covers the Odour of Phenol.** (*Mulford's Lab. Notes, Drugg. Circ.*, 1918, 62, app. 25.) It is noted that

the phenol ointment of the U.S.P. IX has not the same strong carbolic smell of the U.S.P. VIII preparation. The latter had a basis of white petrolatum. The former has a basis of wax 2 and benzoated lard 8.

**Arsenic, Official Test for, in Dutch Pharmacopœia.** (G. Romijn. (*Pharm. Weekblad*, 1917, 54, 1216.) The Dutch Pharmacopœia prescribes the method of Mayençon and Bergeret for the detection of As by forming  $\text{AsH}_3$  and passing it, in a current of  $\text{H}_2$  over paper moist with  $\text{HgCl}_2$  solution. But the conditions are not stated clearly enough to ensure constant sensitivity with different observers. The chief difficulty is the presence of disturbing impurities in the Zn used to generate  $\text{H}_2$ ; yet the yield of gas from pure Zn is so slow as to make the test difficult or impossible. Bougault's method, treating the sample in the cold with  $\text{H}_3\text{PO}_2$  in  $\text{HCl}$  solution with  $\text{HI}$  as catalyst, was found to be even less satisfactory than the official method. Attempts were then made to increase the yield of  $\text{H}_2$  from Zn containing no disturbing impurities. Best results were obtained from a granulated alloy of pure Zn with 5 per cent. of Sn, activated by coating with Cu in ammoniacal  $\text{CuSO}_4$  solution. The conditions of the test should be so regulated that a distinct reaction for As is observed when a minute known quantity of  $\text{As}_2\text{O}_3$  is added to the pure reagents. (See also *Y.B.*, 1904, 29, 30, 33; 1905, 25, 38, 41, 42, 45; 1906, 10, 11; 1907, 18; 1908, 23; 1909, 51, 82; 1912, 148, 149; 1913, 164, 168; 1914, 117, 121; 1915, 122; 1916, 166; 1917, 97; and *Gen. Index*.)

**Atropine Sulphate, The m.p. of.** H. D. Richmond. (*Analyst*, 1918, 43, 168.) In the B.P. the m.p. of atropine sulphate is given as from  $189^\circ$  to  $190^\circ \text{C.}$ ; in the U.S.P. it is stated that it usually melts between  $188^\circ$  and  $191^\circ \text{C.}$ , but when anhydrous and free from hyoscyamine it melts between  $181^\circ$  and  $183^\circ \text{C.}$  These statements are not in accordance with the fact. The melting-point of atropine sulphate is accurately given by Carr in Allen's *Commercial Organic Analysis*, vol. vi., p. 196, where it is stated that, when dried at  $100^\circ \text{C.}$ , it melts at  $194^\circ \text{C.}$ , but the presence of moisture considerably lowers this point. As a matter of fact, the m.p. has been observed on many occasions to be even slightly above  $194^\circ \text{C.}$  In determining the m.p. of atropine sulphate, it is important that the temperature of the bath shall not be too close to the m.p., as atropine

sulphate takes up a small quantity of water very easily, and if immersed in a bath only a few degrees below the m.p. this water is driven off rapidly, but before being so it causes the salt to sinter together and acquire an appearance which may be mistaken for melting, and this will take place within a very few degrees of the temperature of the bath. Shortly after this the salt loses its water, becomes anhydrous, and does not actually melt until the proper temperature has been reached: a false m.p. many degrees low may be easily recorded. If, however, the temperature of the bath is, say,  $25^{\circ}$  or  $30^{\circ}$  C. below the m.p., the water is not driven off so rapidly, and the sintering-point is passed without any marked change, or anything which could be mistaken for the change which takes place at a true m.p. The statement in the U.S.P. that when anhydrous and free from hyoscyamine it melts between  $181^{\circ}$  and  $183^{\circ}$  C. appears to be inaccurate, and is probably based on an old statement in a former B.P.

**Biological Assay Methods of the U.S.P. IX.** P. S. Pittenger. (*J. Amer. Pharm. Assoc.*, 1917, 6, 865.) The methods for the standardization of cannabis, aconite, digitalis, strophanthus, squill, suprarenal gland, and pituitary extracts, are criticized, and, in the main, approved. Verbal alterations in the texts are suggested, as well as one or two manipulative modifications of the method. The adoption of  $\beta$ -iminazoletethylamine hydrochloride as the standard against which pituitary extract is to be compared is not approved. The original communication should be read. (See also *Y.B.*, 1917, 271.)

**Biological Standardization of Heart Tonic Preparations.** H. C. Colson, jun. (*J. Amer. Pharm. Assoc.*, 1918, 7, 13.) It is concluded that the minimum lethal dose for the cat standard affords greater absolute and relative accuracy than the frog method for the assay of digitalis and similar cardiac tonics.

**Cantharides, Tincture of, U.S.P. IX.** W. L. Seoville. (*J. Amer. Pharm. Assoc.*, 1917, 6, 798.) The author has previously shown that no method of percolation with EtOH will extract all the cantharidin from the drug. Glacial  $\text{HC}_2\text{H}_3\text{O}_2$  is an effective solvent; and a mixture of 10 vols. of this with 9 vols. of EtOH 95 per cent. affords a menstruum which exhausts the cantharides and yields a tincture containing so little acetic acid as to be unobjectionable. An alternative is to extract

the drug with acetic ether or with  $\text{CHCl}_3$  and to dissolve the extract after removing the solvent, in  $\text{EtOH}$ .

**Chloral Hydrate Tests and Assay of, and of its Preparations in the French Codex.** M. François. (*J. Pharm. Chim.*, 1917, 16, 289.) *Assay of Chloral Hydrate.*—It is found that the official method of the French Codex, that of Meyer and Haffter, invariably gives slightly high results. In this method 1 Gm. of the  $\text{C}_2\text{Cl}_3\text{HO} \cdot \text{H}_2\text{O}$  dissolved in 100 c.c. of water is treated with 10 c.c. of  $\text{N}/\text{NaOH}$  and left in contact for half an hour. The  $\text{NaOH}$  uncombined is then titrated back with  $\text{N}/\text{H}_2\text{SO}_4$ . Pure  $\text{C}_2\text{Cl}_3\text{HO} \cdot \text{H}_2\text{O}$ , treated thus, assayed 102.1 to 102.6 per cent. This high result is traced to a secondary reaction between the  $\text{NaOH}$  on the  $\text{CHCl}_3$  formed as pointed out by Desgrez :  $\text{CHCl}_3 + 2\text{NaOH} = 2\text{NaCl} + \text{H}_2\text{O} + \text{CO} + \text{HCl}$ . Under the conditions of the official test for  $\text{C}_2\text{Cl}_3\text{HO} \cdot \text{H}_2\text{O}$  pure  $\text{CHCl}_3$  was found thus to use up precisely the amount of  $\text{NaOH}$  equivalent to the 2 per cent. excess of  $\text{C}_2\text{Cl}_3\text{H} \cdot \text{H}_2\text{O}$  found. This error is completely eliminated by reducing the time of contact between the alkali and the hydrate from 30 minutes to 1 minute. If the titration with  $\text{N}/\text{H}_2\text{SO}_4$  is performed 1 minute after the addition of the  $\text{N}/\text{NaOH}$  solution the results obtained will be accurate.

*Tests for Identity.*—It is suggested that the following tests should be given. For these a 1 : 10 aqueous solution is employed. (a) No precipitate should be given when 2 c.c. are treated with a few drops of  $\text{AgNO}_3$  reagent. (b) On adding a fragment of  $\text{Zn}$  to another 2 c.c. of the solution, and 1 c.c. of  $\text{H}_2\text{SO}_4$  : after setting aside for 15 minutes, then decanting from the  $\text{Zn}$  and adding  $\text{AgNO}_3$  the characteristic precipitate of  $\text{AgCl}$  is obtained. (c) To 3 c.c. of the solution, 10 c.c. of rosaniline bisulphite reagent is added. No colour is formed after 15 minutes. On then adding 0.5 Gm. of  $\text{Zn}$  dust and corking the test tube, a red colour is produced in another 15 minutes. (d) If 10 c.c. of the solution, 10 c.c. of  $\text{N}/\text{NaOH}$  and 20 c.c. of water are distilled  $\text{CHCl}_3$  comes over in the first portion of the distillate and collects at the bottom of the receiver. If a drop of I reagent be added to this distillate and shaken up, the  $\text{CHCl}_3$ , coloured violet, becomes very evident. To the residue of the above distillation 10 c.c. of  $\text{N}/\text{H}_2\text{SO}_4$  is added, and after agitation, 1 Gm. of  $\text{CaCO}_3$ , and the liquid is set aside for 15 minutes. It is then filtered and the filtrate divided into two portions. With one portion, the addition of  $\text{AgNO}_2$  will give a white precipitate of  $\text{AgCl}_3$ .



and  $\text{AgCHO}_2$  on warming this rapidly blackens. The second portion treated with 5 drops of  $\text{FeCl}_3$  reagent gives a red colour which is discharged on boiling and an ochre-coloured precipitate is formed.

*Tests for Purity.* — A 1 : 10 solution should give no precipitate with  $\text{AgNO}_3$ . Five c.c. of a 1 : 10 solution evaporated in a tared capsule on the water bath for half an hour should leave no residue. M.p.,  $58^\circ \text{C}$ . Ten c.c. of a 1 : 10 solution is introduced into a small distilling flask with 10 c.c. of  $\text{N}/\text{NaOH}$ ; and 10 c.c. of distillate is collected. This is treated with 2 c.c. of strong  $\text{H}_2\text{SO}_4$  and 2 c.c. of  $\text{N}/10 \text{ K}_2\text{Cr}_2\text{O}_7$ . The mixture is boiled for 5 minutes. The deep yellow colour of the liquid remains unaltered if the chloral hydrate is pure. If it contains only a small admixture of alcoholate, a bluish-green colour is evident and the odour of aldehyde is perceptible. The tests for identity and the assay of the syrup may be carried out as for the hydrate itself except that the  $\text{AgCHO}_2$  test cannot be applied. For the assay 20 Gm. of syrup, 200 c.c. of water, and 20 c.c. of  $\text{N}/\text{NaOH}$  should be used. The number of c.c. of  $\text{NaOH}$  found to be used up on titrating back after 1 minute's contact,  $\times 0.1655$  = the amount of  $\text{C}_2\text{H}_5\text{HO} \cdot \text{H}_2\text{O}$  in 100 Gm. of syrup. (See also *Y.B.*, 1906, 21; 1908, 47; 1914, 259; and *Gen. Index*.)

**Digitalis Tincture, U.S.P., and "Fat-free" Tincture, Deterioration of.** P. S. Pittinger and H. K. Mulford, jun. (*J. Amer. Pharm. Assoc.*, 1918, 7, 236.) Pharmacological experiments show that most tinctures of digitalis deteriorate rapidly in activity. The U.S.P. VIII preparation loses 44 per cent. of its activity in 7 months. "Defatted" tincture prepared from the same parcel of drug, showed a diminution of 32 per cent. of its total activity in the same period of time. (See also *Y.B.*, 1911, 227; 1912, 341; 1914, 236; 1916, 266.)

**Ext. Ipecac. Liq., U.S.P. IX, Criticism of.** J. P. Snyder. (*J. Amer. Pharm. Assoc.*, 1917, 6, 713.) The low alcohol menstruum of the U.S.P. IX ( $\text{EtOH}$  20 per cent., acidified with  $\text{HCl}$ ) is not nearly so satisfactory for exhausting the drug as the menstruum of the U.S.P. VIII ( $\text{EtOH}$  70 per cent.), in fact the former fails to extract but little more than 75 per cent. of the alkaloids. Excessive percolation and consequent concentration produces a large amount of precipitate, which keeps coming down for several months. The standards of at least 1.75 per cent. for the drug and from 1.8 to 2.2 Gm. per 100 c.c. of the alka-

loids for the fluid extract, do not agree. Since no difficulty is experienced in obtaining a drug which will contain at least 2 per cent. alkaloids, the standard for the drug might be raised to this amount.

**Elixir Ferri Quininae et Strychninae Phosph.** W. R. Glover. (*J. Amer. Pharm. Assoc.*, 1917, **6**, 1062.) It is regretted that this preparation has been deleted from the U.S.P. IX and N.F. IV. If made according to the following formula it is a satisfactory and valuable preparation: Soluble ferric phosphate, 17.5 Gm.; quinine, 8.75 Gm.; strychnine, 275 milligrammes; phosphoric acid, sp.g. 1.72, 2 c.c.; ammonium carbonate, 5.1 Gm.; alcohol 95 per cent., 60 c.c.; acetic acid 36 per cent., 16 c.c.; distilled water, aromatic elixir, of each sufficient to make 1000 c.c. Dissolve the quinine and strychnine in the EtOH, then add the  $H_3PO_4$  previously mixed with 350 c.c. of aromatic elixir. Add the  $HC_2H_3O_2$  to the  $Am_2CO_3$  in a flask; do not neutralize, and add the solution to that of the alkaloids. Dissolve the  $FePO_4$  in 30 c.c. of distilled water; add 250 c.c. of aromatic elixir. Add this to the other solution previously warmed. No precipitate will then be formed. If cold solutions are used the precipitate at first formed requires a long period to redissolve. When cold, adjust the volume to 1000 c.c. with aromatic elixir. Filter after standing for 24 hours.

**Ginger, Tincture of, U.S.P.** J. P. Snyder. (*Amer. J. Pharm.*, 1918, **90**, 253.) The U.S.P. requirement that not more than 15 per cent. of the total solids of the tincture should be soluble in 20 c.c. of water is criticized. It is shown that tincture of ginger, the percentage of water-soluble solids of which is greater than 15 per cent., can be prepared from strictly U.S.P. Jamaica ginger, using 95 per cent. EtOH as the menstruum. The percentage of water-soluble solids is variable, depending upon the length of time the water is allowed to remain in contact with the solids and also, to a great extent, upon the manner in which the solids are brought in contact with the water. If the water-soluble solids requirement serves any practical purpose, and is to be retained, the U.S.P. should state the way and manner in which it is to be obtained, and also establish a limit that can be met when the tinctures are prepared from the U.S.P. Jamaica ginger and 95 per cent. alcohol. In determining the total solids, the statement in the Pharmacopoeia should be changed from 'Evaporate 10 Gm. of tincture of ginger' to 'Evaporate

about 10 Gm. of tincture of ginger accurately weighed," as the tincture is volatile and it is impractical and unnecessary to weigh exactly 10 Gm. Also it would probably be better to state that the total solids should be dried to constant weight at 100° C., as somewhat lower results may be obtained and also more accurate checks if the determination is made in this manner. The minimum limit as well as the maximum should be stated for the total solids to prevent adulteration by dilution. The following standards in addition to qualitative tests for capsicum or other pungent substitute would probably be all that would be necessary to prevent adulteration of tincture of ginger and at the same time show the product to be of a good quality: EtOH, about 90 per cent. by volume; sp.g., about 0.82; non-volatile solids, not more than 1.75, nor less than 1.25 per cent.

**Homatropine and the Vitali Test.** H. D. Richmond. (*Analyst*, 1918, 43, 167.) In both the B.P. and the U.S.P. the Vitali test is given as the means of distinguishing homatropine from atropine, hyoscyamine, or hyoscyne. Although the hydrobromide is the only official salt, this test might be presumed to be applicable to other salts of homatropine. In the case of the sulphate, however, a distinct violet colour is obtained when 0.01 Gm. of homatropine sulphate is evaporated with 5 drops of  $\text{HNO}_3$  to dryness in a porcelain dish on a water bath, and a few drops of alcoholic KOH are added to the residue. It was found that when prepared with pure homatropine which did not give a Vitali test, the sulphate yielded a violet coloration, and that addition of the equivalent amount of  $\text{H}_2\text{SO}_4$  to homatropine hydrobromide, or hydrochloride brought out a violet coloration. It would appear, therefore, that the  $\text{H}_2\text{SO}_4$  of the sulphate so intensifies the action of the  $\text{HNO}_3$  as to produce a result which is not given in the absence of  $\text{H}_2\text{SO}_4$ . It was found that when the alkaloid is separated from the homatropine sulphate and the Vitali test carried out on this instead of on the original salt no violet coloration is obtained, and it appears, therefore, to be necessary to use this modification of the Vitali test as a means of distinguishing between atropine, hyoscyamine, or hyoscyne and homatropine, when the sulphate is tested, and the direct result should not be accepted as positive until the test has been repeated on the extracted alkaloid.

**Iodine Ointment, Stability of.**—L. E. Warren. (*Amer. J. Pharm.*, 1917, 89, 339.) During the process of manufacture

of iodine ointment about 20 per cent. of the free I goes into combination with the fatty constituents of the ointment. On standing for a month approximately an additional 5 per cent. goes into combination, after which there is practically no loss in free I content. Iodine ointment which is a month old is a relatively stable preparation. It appears to make no noticeable difference upon the rate and amount of I absorption whether the lard from which the ointment is made has a high or a low I absorption value. The composition of iodine ointment, which has been made sufficiently long to have reached equilibrium, is approximately as follows: Free I, 3 per cent.; I combined with fat, 1 per cent.; KI, 4 per cent.; lard (containing I), 80 per cent. The U.S. Pharmacopœia requirement that iodine ointment shall be freshly prepared when wanted appears to be unnecessary. The presence of an iodide appears to be necessary, to prevent practically all of the iodine from entering into combination with the fat. (See also *Y.B.*, 1913, 355; 1915, 270; 1917, 103; and *Gen. Index*.)

**Kola Extract of the French Codex.** Bouvet. (*J. Sci. pharm.*, 1917, through *Répertoire*, 1918, 29, 67.) In the official text of the Codex it is not clearly stated whether the 10 per cent. of caffeine which the finished solid extract of kola is required to contain is to be in the anhydrous condition, or to contain 1 mol  $H_2O$ . The point is not negligible, since 10 parts of the anhydrous base = 10.928 of the same in the hydrated condition. Examination of commercial extracts shows them to vary in caffeine content from 8.07 to 9.3 per cent. It is evident, therefore, that there is difficulty in preparing the extract of the official standard if this is to be anhydrous caffeine. The difficulty in preparing the granules of kola to contain 10 per cent. of caffeine, using these weak extracts is even greater. Another defect in the official extract is the undue amount of resin it contains. In making granules, this blocks the meshes of the sieves when the soft paste is rubbed through them and causes unnecessary labour and cost. Also it forms dark hard specks in the finished product rendering it unsightly. In the next edition of the Codex the explicit statement should be made that the finished product must contain 8 per cent. of anhydrous caffeine. To eliminate the resin, the alcoholic liquid extract should be allowed to stand for some time, and the decanted clear solution only be taken for distilling off the alcohol. The



remaining deposit from this may be washed with the same menstruum filtered, and the filtrate distilled to obtain the rest of the extract. (See also *Y.B.*, 1915, 271.)

**Lime Water, B.P. Directions for Making.** (*Chem. and Drugg.*, 1917, 89, 740.) It has been suggested that the B.P. directions for making lime water—"shake for 2 or 3 minutes: set aside until clear"—are defective. It is probably the practice to shake the  $\text{Ca}(\text{OH})_2$  and water together for a longer period than that ordered in the Pharmacopoeia, but it would be as well to have the point settled experimentally. The preparation of the lime water is one of the simplest operations, but yet there are several pitfalls for the unwary. The chief difficulty is caused by the use of  $\text{Ca}(\text{OH})_2$ . In the B.P. 1898 the lime water, after shaking for 2 or 3 minutes, was required to be set aside "for 12 hours," but in the B.P. 1914 no time is stated.

**Liquor Cresolis Co. U.S.P. IX, Determination of Water in.** W. W. Dawes. (*J. Amer. Pharm. Assoc.*, 1917, 6, 880.) The desirability of introducing an official test for the determination of the amount of water in this disinfectant is suggested. The following is proposed as the method: Measure 100 c.c. of the compound solution of cresol and 100 c.c. of xylol into a dry distilling flask. Rotate carefully in order to mix the two liquids and distil through a dry condenser. Collect about 150 c.c., or until the distillate is coming over clear, in a dry graduated cylinder. The number of c.c. of water, the lower layer, gives the per cent. of water present.

**Liquorice Extract, Methods of Preparation.** G. Pichard. (*J. Pharm. Chim.*, 1918, 17, 16.) The various methods of extracting liquorice root are discussed. The process of the U.S.P. IX cold percolation with water containing a little  $\text{AmOH}$  is considered best. Next in value is cold percolation with plain water. Methods of hot lixiviation or percolation are condemned. Warm water not only causes the partial hydrolysis of glycyrrhizin, but also extracts a nauseous bitter resin, which spoils the flavour of the final product. (See also *Y.B.*, 1916, 377.)

**Magnesia, Calcined, Suggested Improved Tests for, in French Codex.** A. Astruc. (*J. Pharm. Chim.*, 1917, 16, 65, 110.) After adversely criticizing the tests for  $\text{MgO}$  in the Codex the author suggests the following: Calcined magnesia should be quite white and very light. It should not lose more than 3

or 4 per cent. in weight when heated to  $100^{\circ}\text{C}$ . (limit of moisture). This dried and weighed product should not show a further loss of more than 5 or 6 per cent. when calcined, and when suspended in acidified water it should dissolve without brisk effervescence (limit of carbonate). The solution should be rapid (absence of foreign matter). The solution in  $\text{HNO}_3$  should give practically no precipitate with  $\text{BaCl}_2$  nor with  $\text{AgNO}_3$  (limit of  $\text{SO}_4$  and  $\text{Cl}$ ), and when treated with  $\text{AmCl}$  and excess of  $\text{AmOH}$  no precipitate of  $\text{Fe}_2(\text{OH})_6$  or  $\text{Al}_2(\text{OH})_6$ . When 0.1 Gm. is dissolved in 20 c.c. of  $\text{HC}_2\text{H}_3\text{O}_2$  1 : 100, and the solution is treated with 2 c.c. of 6 : 100 solution of  $\text{H}_2\text{C}_2\text{O}_4$  no turbidity should be evident after 10 minutes (limit of  $\text{Ca}$ ).

**Sodium Benzoate, U.S.P. Standards for.** C. E. Smith. (*Amer. J. Pharm.*, 1917, 89, 576.) One of the defects in the U.S.P. IX monograph is the failure to state explicitly that the benzoic acid forming part of the salt must conform to the same standard of purity as that required for benzoic acid itself under its own separate heading. Another is the failure to adequately restrict the water content. Still another is the inadequacy of the assay method prescribed. Much benzoic acid contaminated with excessive quantities of chlorobenzoic acid and other impurities is circulating in this market. As this cannot be sold as benzoic acid U.S.P., much of it is likely to be made into the sodium salt, with the impurities remaining in the product, and disposed of under a lax interpretation of the U.S.P. requirements. It is a fact apparently little known that this salt can hold as much as 11 per cent. of water without showing it. The texts of the eighth and ninth revisions of the U.S.P. make no explicit provisions concerning permissible water content and ignore the fact that a hydrated salt exists, but they lead to the inference that the official salt was intended to contain but little water at most. It can be readily seen that a variation of 11 per cent. in strength is considerably beyond reasonable limits, for commercial reasons as well as for medicinal dosage. The B.P. 1914 requires absence of more than 4 per cent. of water. This is a perfectly fair restriction and the U.S.P. should have made a similar specific provision. The official assay method does not with certainty show whether the salt actually contains the required minimum percentage of benzoic acid. It shows merely how much alkali remains after burning off the organic acid or acids in combination with it and does not necessarily indicate

the quantity of benzoate present. A direct determination of the benzoic acid, which is the important constituent, is decidedly preferable for that reason, also because of other sources of error in the method. It would be quite possible to adulterate sodium benzoate scientifically with sodium salts of cheaper organic acids in such manner that the fraud would not be detected by means of the U.S.P. IX tests alone.

**Squill and its Preparations, U.S.P. Biological Standard for.** H. C. Colson, jun., and H. Engelhardt. (*J. Amer. Pharm. Assoc.*, 1917, 6, 950.) Both fluid extract and tincture of squill when prepared strictly according to the official process very frequently fail to meet the biological requirements of the U.S.P. IX.

The U.S.P. requires that the two preparations be of the same biological strength as the fluid extract and tincture of digitalis, in other words, that 0.006 Gm. of both fluid extract of digitalis and fluid extract of squill and 0.0006 Gm. of tincture of digitalis and tincture of squill be the minimum systolic (not lethal) dose for each gramme of body weight of frog; but while the dose for fluid extract of digitalis is given with 0.05 c.c. and that for the tincture with 0.5 c.c., 0.1 c.c. or double the dose is given as the average dose of fluid extract of squill and also 1.0 c.c. for the tincture. Thus it may be justly assumed that the Pharmacopœia admits that squill preparations possess only half the strength of the corresponding digitalis preparations. This assumption seems to be correct, as can be seen from the following results, which were based on the requirements for the fluid extract that 0.0006 be the minimum systolic dose per gramme of body weight of frog and 0.006 be the corresponding dose for the tincture.

In order to test the biological strength of various commercial fluid extracts of squill four samples of this preparation made by as many different manufacturers, and designated as I, II, III, IV, were examined by the cat method, the 1-hour frog and the 12-hour frog methods. The following results expressed in percentage of the official standard were obtained:

	Cat Method.	1-Hour Frog Method.	12-Hour Frog Method.
I . . .	42.2 per cent.	53.3 per cent.	42.2 per cent.
II . . .	25.4 per cent.	63.2 per cent.	33.8 per cent.
III . . .	68.5 per cent.	200.0 per cent.	120.5 per cent.
IV . . .	43.7 per cent.	144.0 per cent.	52.8 per cent.

The results obtained by the cat method were based upon a

standard of 100 milligrammes of squill for kilo body weight of cat, which corresponds to the standard of fluid extract of digitalis.

**U.S.P. IX, Report of the Committee of the American Pharmaceutical Association on.** (*J. Amer. Pharm. Assoc.*, 1918, 7, 296.) The following are a few of many practical criticisms and suggestions, selected as being of general interest :—

*Acidum. Citricum.*—This is distinctly efflorescent. As long as the crystals remain distinctly translucent they may be assumed to be non-effloresced; but with the powder, this cannot be judged. In the assay, therefore, the sample should be dried to constancy at  $100^{\circ}\text{C}$ . before weighing off, and should then assay 99.5 per cent. of  $\text{H}_3\text{C}_6\text{H}_5\text{O}$ .

*Aconitum.*—The assay process for the liquid and solid extract should be revised. It is impossible to obtain concordant results by titration when using cochineal indicator. Methyl orange is preferable.

*Alkaloids and Alkaloidal Drugs.*—It is recommended that a rubric should be given for all alkaloids and alkaloidal drugs. Many commercial alkaloids and their salts contain an excess of water. It is also necessary to examine qualitatively the alkaloidal residue obtained from many galenical preparations.

*Oak Sawdust in Assay of Fluid Extracts.*—In several of the assay processes for fluid extracts and tinctures purified oak sawdust is required to be used as a filtering medium. This is not easily procurable. Cheese cloth is suggested as a substitute.

*Efflorescent Salts.*—In many instances the assay process for these salts directs that they shall be weighed off in the actual condition of hydration in which they occur, instead of first being rendered anhydrous or of a definite degree of hydration. Thus *copper sulphate* should be directed to be dried to constant weight at  $110^{\circ}\text{C}$ ., when it will be  $\text{CuSO}_4\text{H}_2\text{O}$ . It should then assay not less than 99.5 per cent. of the same degree of hydration. For *ferrous sulphate*, the drying should be at  $115^{\circ}\text{C}$ ., and the titration should give 99.5 per cent. of  $\text{FeSO}_4\text{H}_2\text{O}$ . For *magnesium sulphate* the monohydrated salt  $\text{MgSO}_4\text{H}_2\text{O}$ , obtained by heating the crystals to constancy at  $150^{\circ}$ , is recommended as the starting point for assay. For *sodium sulphate* anhydrous  $\text{Na}_2\text{SO}_4$ , obtained by drying to constancy at  $100^{\circ}$ , should be used. *Zinc sulphate* should be dried at  $120^{\circ}\text{C}$ . to constancy to obtain the monohydrated salt  $\text{ZnSO}_4\text{H}_2\text{O}$  for assay. *Sodium Arsenate*.



—The anhydrous salt, dried at  $150^{\circ}\text{C}$ ., should be taken for assay. *Sodium acetate* should be dried at  $120^{\circ}$ . *Borax*.—When dried thoroughly and the residue heated to redness it becomes anhydrous, losing, if pure, 47.14 per cent. of water. Instead of reducing the salt to an anhydrous condition before weighing a portion for assay, it is better to powder about 15 Gm. of the sample and weigh out separately two portions, one of about 5 Gm., the other of about 1 Gm., both to be weighed accurately. Dry the smaller portion and heat it to the point of igneous fusion. From the loss in weight of this sample determine the weight of the larger sample in anhydrous condition. Use this portion for the assay, calculating its equivalent and the result as  $\text{Na}_2\text{B}_4\text{O}_7$ . *Sodium Sulphocarbolate*.—Dried at  $120^{\circ}\text{C}$ . the salt loses the whole of its water of crystallization. It should be thus dried before it is weighed for assay. *Sodium Phosphate*.—This is really a very efflorescent salt. For assay as to purity it may be dried to constant weight at  $110^{\circ}\text{C}$ . *Sodium Thiosulphate*.—The crystallized salt when pure contains 36.29 per cent. of water of crystallization. Whether it can be brought to the anhydrous condition without decomposition is doubtful, but, if so, it is an easy matter to determine the purity of the sample by drying and titrating the residue with tenth-normal iodine, V.S. If the plan of drying to constant weight is impracticable, the salt can still be brought to the form of sulphate and its weight compared with the theoretical yield of that salt. Only crystals should be official. These, when kept in well-closed containers in a cool place, are not liable to change materially.

DELIQUESCENT SALTS.—*Calcium Chloride*.—A purity rubric for this salt is wanting. The only requirement is that “the salt without previous drying shall show the presence of not less than 75 per cent. of  $\text{CaCl}_2$ .” The salt is described as “very deliquescent” and yet it is required to show on assay more  $\text{CaCl}_2$  than it would contain if but one per cent. of hygroscopic moisture were present, the salt otherwise consisting of pure  $\text{CaCl}_2 + 2\text{H}_2\text{O}$ . A better requirement is that of the B.P., viz. “when dried at  $200^{\circ}\text{C}$ . the salt shall lose not more than 5 per cent. of moisture.” Preferably establish a purity rubric perhaps of 99 per cent. For the assay direct that the salt be dried at  $200^{\circ}\text{C}$ . before weighing, every precaution being taken to prevent absorption of moisture during the weighing. Proceed as in the text, but the statement will read: “It shows in the

dried salt not less than 99 per cent. of  $\text{CaCl}_2 + 2\text{H}_2\text{O}$ .—*Calcium Bromide*.—This case is closely analogous to that of  $\text{CaCl}_2$ , except that a somewhat larger percentage of impurity (presumably chloride) has to be tolerated. Probably a rubric of 98.5 per cent. would be reasonable. Then the assay would be conducted as in the case of calcium chloride, drying the salt at  $200^\circ\text{C}$ . before weighing. *Lithium Bromide*.—It is very doubtful if it is practicable to dry this salt without loss of Br. If it is, a rubric of purity may be fixed as in the case of  $\text{CaCl}_2$ . *Ammonium Iodid*.—It is stated in the text that the salt soon becomes yellow or yellowish brown on exposure to air and light, but nothing is said of its unfitness for use in this condition, or of any remedy. It would seem that merely drying it at a temperature of  $110^\circ\text{C}$ . should render it fit for dispensing. *Tartarated Antimony*.—The salt is efflorescent, therefore it should be rendered anhydrous for the assay by drying it to constant weight at  $110^\circ\text{C}$ .

CAUTIONS AGAINST INJURIOUS EFFECTS OF OFFICIAL ARTICLES.—A. B. Lyons suggests that the U.S.P. should give an official indication of the substances which should be classed and carefully handled as poisons, and should give the maximum permissible dose of these.

**White Precipitate, Preparation, Properties and Analysis of.** I. M. Kolthoff. (*Pharm. Weekblad*, 1918, **55**, 208, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 1104.) White precipitate ( $\text{NH}_2\text{HgCl}$ ) is changed by  $\text{NH}_4\text{Cl}$  to  $(\text{NH}_3)_2\text{HgCl}_2$  and by  $\text{H}_2\text{O}$  to  $\text{NHg}_2\text{Cl.H}_2\text{O}$ ; hence an excess of either should be avoided in its preparation. The various pharmacopœias agree quite closely with the Dutch Pharmacopœia, which prescribes the proportions:  $\text{HgCl}_2$  10,  $\text{H}_2\text{O}$  200,  $\text{NH}_3$  13 (in 10 per cent. solution). The precipitate thus prepared is to be washed with 90 parts of water. Experiment shows that this is best divided into about 9 equal portions for washing, and that if these conditions are strictly adhered to, nearly pure  $\text{NH}_2\text{HgCl}$  is obtained, with hardly any of the above side reactions. The equilibrium  $2\text{NH}_2\text{HgCl} + \text{H}_2\text{O} = \text{NHg}_2\text{Cl.H}_2\text{O} + \text{NH}_4\text{Cl}$  is slowly displaced to the right with increasing concentration of  $\text{NH}_2\text{HgCl}$ ; 227.5 Mgm. of white precipitate in 100 c.c. of water showed 96 per cent. decomposition after shaking 2 days. In the analysis of white precipitate, Hg is best determined by dissolving the sample in an excess of N/10 acid and titrating back slowly with N/10 alkali, using dimethyl yellow as indicator. A little NaCl

must be added to form the complexion  $\text{HgCl}_4$ , since  $\text{HgCl}_2$  is slightly acid to the indicator. Rupp's argentometric method is seriously at fault because the Cl of  $\text{HgCl}_2$  is by no means completely precipitated by  $\text{AgNO}_3$ . The N is best determined by dissolving the sample in acid, precipitating the Hg as  $\text{HgS}$  and distilling the  $\text{NH}_3$  from alkaline solution. Cl is determined by the Volhard method after dissolving in acid, treating with alkaline formalin solution, removing the metallic Hg and acidifying with  $\text{HNO}_3$ .

## NOTES AND FORMULÆ

**Anopheles, Power of Infection not Permanent.** E. R o u b a r d. (*Comptes rend.*, 1918, **166**, 264.) It is stated that the micro-organisms of paludism in infested adult *Anopheles* disappear entirely from the salivary glands and secretion of the insect during the period of hibernation. Even in the non-hibernating condition the sporozoids of paludism are all discharged from the glands and proboscis after the insect has inflicted a few bites. Consequently the salivary plasmodian infectivity of *anopheles* is only temporary and fugacious. In this respect it differs from the infectivity of *Glossina* infested with trypanosomes, which is permanent.

**"Army" Corn Cure.** (*Amer. Drugg.*, 1918, **66**, 189.) Salicylic acid, 10 Gm.; petrolatum, 10 Gm.; anhydrous wool-fat, 30 Gm. This is claimed to be very effective.

**Artificial Honey.** (*Pharm. Zeit.*, through *Schweiz. Apoth. Zeit.*, 1918, **56**, 116.) Sugar, 1 kilo, is dissolved in water, 500 Gm. It is heated to boiling and skimmed to remove impurities. Buttermilk, 2 litres, is then very gradually stirred into the boiling syrup. Boiling is continued with constant stirring until the greater part of the liquid has evaporated. Evaporation is then continued on the water bath until the final weight is 1300 to 1400 Gm.

**Aural Obstructions, Compound Solvent for.** E. C r o u z e l. (*Répertoire*, 1917, **28**, 356.) The following formula has given good results for the removal of obstructive concretions from the external auditory meatus: Solution of ammonia, 4; sterilized poppy-seed oil, 9; ether, 9; eucalyptol, 1. Add the poppy seed oil to the solution of ammonia in a flask and shake

well for 10 minutes to promote saponification. Then warm on the water-bath, to drive off the excess of  $\text{AmOH}$ ; cool, and add the  $\text{Et}_2\text{O}$  and eucalyptol. Again mix, and label "shake the bottle." A pledget of absorbent cotton moistened with some of the mixture is introduced into the ear. Pressure with the finger is then applied to the tragus, to squeeze out the liquid into the ear passage. This operation may be repeated two or three times daily. After several days the obstruction may be removed. The application of hot flannels to the ear facilitates the action of the solvent.

**Bacteria, Presence of, in Poisonous or Aromatic Seeds.** V. Gulippe. (*Comptes rend.*, 1917, 165, 432.) As might be supposed the presence of powerfully toxic substances, or much essential oil, does not render seeds free from bacteria. Cultures made with the seeds named below show that they give a plentiful bacterial flora: *Physostigma venenosum*, *Strychnos nux vomica*, *S. ignatia*, *Phaseolus lunatus*, *Taxus baccata*, *Myristica officinalis*, *Dipteryx odorata*, *Piper nigrum*, *Coffea arabica*.

**Bath Cologne.** H. C. Muldoon. (*Bull. Pharm.*, 1917, 31, 465.) Oil of bergamot, 2 drachms; oil of lemon, 1 drachm; oil of neroli,  $\frac{1}{2}$  drachm; oil of rosemary, 20 minims; oil of origanum, 5 minims; Tincture of vanilla, 1 drachm; ethyl acetate,  $\frac{1}{2}$  drachm; orange flower water, 2 oz.; alcohol 95 per cent., 24 oz. Variations may be made by the use of small amounts of rose-geranium, musk, or violet. Canada snake-root gives an especially pleasing touch.

*Headache Colognes* can be made from the bath colognes by the addition of menthol—about 1 drachm to the ounce. The merest trace of the volatile oil of mustard might be an effective addition.

**Bird Manna.** (*Amer. Drugg.*, 1918, 66, 19.) The following formulæ is employed by fanciers for certain cage birds: (I) Blanched sweet almonds, 4 oz.; powdered corn meal, 8 oz.; red pepper, 2 drachms; yolk of egg, enough; glucose or honey, enough. Work into a mass which may be cut into small cakes and covered with tin foil. (II) Blanched sweet almonds, 4 oz.; rice or pea flour, 8 oz.; lard, 1 oz.; glucose, enough. Reduce the almonds to a smooth paste. Add the other ingredients and knead into a mass of proper consistence, which can then be cut into cakes of proper size and encased in tin foil. A device to attach the cake to the cage wires is also desirable.



**Borax, Harmful Effect of, on Vegetation.** W. H. Roberts, A. Smeetham and J. A. Voelcker. (*Analyst*, 1918, 43, 58.) Experiments by Voelcker at Woburn Experimental Station have shown that the presence of 0.043 per cent. of borax in soil is destructive to wheat and barley. Other experiments showed the possibility of borates accumulating in the soil. A case has occurred in which crops on a sewage farm have been destroyed by turning on them the waste liquor from a borax works. Samples of the dried soil were found to contain 0.04, 0.032, 0.036 and 0.168 per cent. of borax. [This is of interest in view of the proposal to use borax to destroy fly larvae in horse manure. Evidently, if so used, care is needed to avoid excess.—ED. Y.B.]

**Burettes, Increasing the Delicacy of Delivery of.** E. H. Merritt. (*Analyst*, 1918, 43, 138.) It is well known that waxing the exterior of the jet of a burette slightly decreases the size of the drop. The method proposed consists merely in waxing both the inside and the outside of the jet. The clean and dry burette is warmed, and the jet immersed to a depth of about three-quarters of an inch into melted paraffin wax (m.p. about 55° C.). The burette is then vigorously shaken for a few seconds to remove excess of wax. If the layer of wax should be too thick, it may be reduced to the desired extent by warming gently over a small flame and shaking. By this means it is quite easy to increase the delicacy of a 50 c.c. burette from 20 to 40 drops per c.c. Each drop leaves the burette cleanly, and the liquid has no tendency to creep up the outside. Moreover, the increased delicacy is obtained without any sacrifice of strength, such as occurs by drawing out the jet to a fine point. If the walls of the jet are abnormally thick, it may be advisable to first file them down slightly at the tip, using a solution of camphor in turpentine as a lubricant; as a general rule, however, this is quite unnecessary.

**Burgundy Mixture and Bordeaux Mixture for Potato Spraying.** (*Board of Agriculture Food Production Leaflet 43.*) **BURGUNDY MIXTURE.**—The mixture should be carefully made, otherwise injury to the foliage may result. It is essential that all the soluble copper be precipitated by the addition of sufficient soda. Whilst adding the soda to the solution of copper sulphate the mixture must be vigorously stirred. The precipitate formed by the mingling of these two substances should be floc-

culent and should remain in suspension for a considerable time.

*For Spraying  $\frac{1}{3}$  Acre (say 50 rods).* (1) Dissolve 4 lb. of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in 5 gallons of water in a barrel capable of holding 40 gallons, then make up to 35 gallons. N.B.—*Iron or Zinc vessels must not be used.* (2) Dissolve in another vessel in 5 gallons of water 5 lb. of washing soda (previously broken up into small pieces if necessary). (3) When the soda is *completely* dissolved, add (2) to (1), stirring vigorously meanwhile. N.B.—Both copper sulphate and soda should be of fully 98 per cent. purity. Where smaller areas are to be sprayed, barrels capable of holding 10 gallons may be used: in that case the quantities of copper, sulphate and soda given above should each be reduced to  $\frac{1}{4}$ , namely, 1 lb. of sulphate copper and  $1\frac{1}{4}$  lb. of washing soda. Burgundy mixture should be bright blue in colour, and should not settle for a considerable time. Experience has shown that the precipitate remains longer in suspension and adheres better to the foliage when the mixture is made up in the above manner than when the soda is added to a solution of copper sulphate. The fungicide should be used in a *fresh state* and in no case should it be applied more than 10 hours after it has been made.

**BORDEAUX MIXTURE.**—This mixture should be made up in the following proportions:  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , 4 lb.; quick lime (freshly burnt lumps), 2 lb.; water, 40 gallons. The  $\text{CuSO}_4$  should be dissolved in 35 gallons of water in a barrel. The lime should be placed in a separate vessel and slaked *slowly*. This is best done by adding only the amount of water which the lime can absorb. After the lime is thoroughly slaked, more water should be added gradually, stirring all the time, to make up to 5 gallons. It should then be strained through a fine sieve and added to the solution of  $\text{CuSO}_4$ , the contents of the barrel being vigorously stirred during the mixing. (See also *Y.B.*, 1915, 357.)

**Button Polish.** (*Drugg. Circ.*, 1918, 62, 218.) Zinc oxide, 4 drachms; precipitated chalk, 2 drachms; methylated alcohol, to make 4 oz. Apply with a soft cloth and polish briskly with chamois or other polishing medium.

**Carbon Bisulphide Vapour as an Insecticide.** W. E. Hinds. (*U. S. Dep. Agric. Bull.*, 799.) With due caution, on account of the highly inflammable vapour,  $\text{CS}_2$  may be used as an insecticide for a number of purposes for destroying household or horticultural insect pests. On account of the high density and

ready diffusibility of its vapour it is specially useful for dealing with wood-boring or burrowing insects, such as the hymenoptera and larvae of lepidoptera or coleoptera. The most efficient small gas-tight chamber for ordinary use is a water-tight barrel. If a room is required to be made into a fumigating chamber this may be covered with tarred builders' paper. Grain and seeds may be freed from weevils and other insects by filling into barrels and then pouring in half a cupful of  $\text{CS}_2$  through the bung-hole and bunging up tight, and a barrel with the head out, and then covering over the head with two layers of heavy wrapping paper. After a few days the contents should be examined. If any living insects are found, the treatment should be repeated.  $\text{CS}_2$  is the best of all known insecticides for destroying ants. The entrance to the nest must be traced and  $\text{CS}_2$  evaporated near by, the spot being covered by an upturned tub or pail, which is left in position for 6 hours. Clothes' moths and larvae may be destroyed in various fabrics by packing them in a tight tin or barrel and introducing  $\text{CS}_2$ , which in many instances may be poured directly on to the fabrics. After closing up for some hours in the receptacle the articles are to be taken out and aired. All unpleasant odour will be quickly dissipated.  $\text{CS}_2$  is very efficient for destroying museum pests. It may be introduced into many show cases and specimen cabinets and allowed to volatilize therein. Insects differ in their powers of resistance to this poison as to others. Generally speaking, beetles require a much longer exposure to the vapour than insects of other classes. [ $\text{CS}_2$  is a most efficient poison for wasps. If it is poured at night into the entrance to the nest, and a clod of earth is placed over, the nest may be dug out the next morning. The workers will all be dead and the white "grubs," prized as bait by anglers, speedily lose all smell of the  $\text{CS}_2$  if left exposed to the air for a few minutes. - Ed. Y.B.]

**Castor Oil for Dressing Wounds.** L. Revillet. (*Lyon med.*, 1917, 126, 355, through *J. Amer. Med. Assoc.*, 1917, 69, 1303.) Castor oil never dries up, so that dressing impregnated with it never sticks to the wound, no matter how long it is in contact with it. Another advantage of castor over other oils is its characteristic slipperiness which facilitates the working in of wicks, and renders their extraction easy and harmless. Its chief advantage is that it dissolves EtOH, tinctures, and

essential oils. Oil of thyme, oil of lavender and oil of eucalyptus, of each 0.4 c.c., in a litre of castor oil produce an agreeable aromatic lubricant and dressing which deodorizes at once and never irritates, while it has some antiseptic power.

**Castor Oil, Method for Taking.** (*Pharm. Zentralh.*, through *Schweiz. Apoth. Zeit.*, 1917, 55, 683.) A little brandy or rum is placed in a large wine glass and run round the sides so as to thoroughly wet the whole inside. The rim is also moistened with the finger, dipped in the spirit. The dose of castor oil is then introduced, followed at once by two tablespoonfuls of water. A couple of turns of the liquid will then make the oil float like the yolk of an egg in the aqueous medium. A dash of rum or brandy is then added, and the whole is swallowed like an oyster and scarcely any taste of the oil will be noticed.

**Cleaning Windows.** (*Drugg. Circ.*, 1917, 61, 579.) Choose a dull day, or at least a time when the sun is not shining on the windows, for when the sun shines on the glass it causes it to dry streaked, no matter how much it is rubbed. Take a painter's brush and dust the windows inside and out, washing all the woodwork inside before touching the glass. The latter must be washed slowly in warm water and ammonia—do not use soap. Use a small cloth with a pointed stick to get the dust out of the corners: wipe dry with a soft piece of cotton cloth—do not use linen as it makes the glass fluffy when dry. Polish with tissue paper or old newspaper. This method requires half the time taken when soap is used, and the result will be brighter windows.

**Cobblers' Wax.** S. Pollard. (*Pharm. J.*, 1917, [4], 45, 242.) Swedish pitch, 2 lb.; resin, 1 lb.; tallow, 3 oz.; melt together. When melted, pour into a bucket of cold water, and when it can be handled take it out and pull it and fold over, and pull it again and again, until it acquires a nice brown colour. If it gets too stiff before this happens, put it in some warm water and go on pulling. This is the secret of making good cobbler's wax. While plastic cut into small lumps.

**Cold Cream.** (*Drugg. Circ.*, 1918, 62, 23.) White mineral oil, 96 fl. oz.; rose water, 53 fl. oz.; spermaceti, 12 oz.; white wax, 32 oz.; borax, 1 oz. Melt the spermaceti and wax together and add the mineral oil. Heat the rose water in a separate vessel and dissolve the borax in it. Raise the temperature



of the rose water-borax solution to approximately the same temperature as that of the melted waxes and oil and mix them. Whip with an egg beater or other similar implement while cooling and when nearly cool add the required perfume. A mixture of oil of neroli, 25 drops; and oil of rose, 5 drops, is quite satisfactory as a perfume. (See also *Y.B.*, 1913, 367, 368; 1915, 348, 350, 380, 381; 1916, 393, 403, 428; 1917, 297, 306.)

**Cough Mixture for Children.** (*Amer. Drugg.*, 1918, 66, 16.) Ammonium carbonate, 1 drachm; acacia, 1 oz.; glycerin, 6 fl. oz.; wine of ipecac., 3 fl. oz.; wine of antimony, 6 fl. drachms; spirit of chloroform, 2 fl. drachms; honey, 1 lb.; hot water, to make 32 fl. oz. Mix. This is stated to give a very effective and popular preparation.

**Cow's Milk, Modified, for Infant Feeding.** A. B. Marfan. (*Le Nourrisson*, 1917, 5, 657, through *J. Amer. Med. Soc.*, 1918, 79, 657.) The author gives the history of efforts in this line by various pediatricists in different countries. The practice he has found most advantageous is to give milk half and half with boiled water sweetened with 10 per cent. of cane sugar the first days, and two-thirds milk to one-third sweetened water during the first 4 months, and after this three-fourths to one-fourth. If the child is thriving, then pure milk sweetened a little can be given. If digestive disturbance develops, he returns to the one-fourth or one-third mixture. When these modifications are well mixed and well sterilized, most healthy infants digest them perfectly. Constipation is less than with pure sterilized milk; the stools are softer and yellow, although not quite like those of the breast-fed. Vomiting is as rare as diarrhoea. The children do not gain in weight as fast as the breast-fed, but the difference is not great, and it is soon made up, thanks to the soundness of the digestive tract, when the time comes for the pure milk. The water used is not sweetened at all during the first week; after that it is sweetened with cane sugar. It is boiled for 2 or 3 minutes and sugar added while it is boiling. If the sterilization is done in a water bath, the milk and the sweetened boiled water can be mixed beforehand. It is preferable to have only half the daily quantity of the sweetened water prepared at one time.

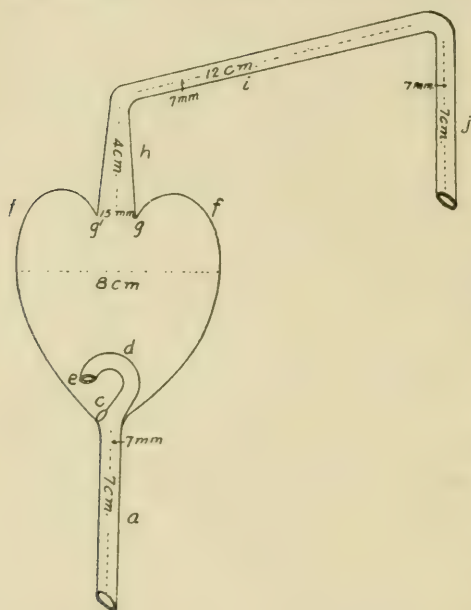
**Creeping of Solutions during Evaporation, Prevention of.** W. O. Robinson. (*J. Am. Chem. Soc.*, 1918, 40, 197.)

Creeping can easily be prevented by painting a strip about  $\frac{1}{4}$  inch wide around the inner rim of the dish with collodion.

**Distilled Water, Carbonation of.** H. E. Patten and G. H. Mains. (*J. Ind. Eng. Chem.*, 1918, 10, 279.) A series of experiments on the carbonation of water, conducted with a view to their practical bearing on the manufacture of aerated beverages, at the instance of the U.S. Department of Agriculture, is thus summarized: Regular rate of pressure recovery nearly reproducible and evidently logarithmic in form were obtained. A high degree of impregnation of water with  $\text{CO}_2$  was obtained, using a rotary stirrer, while maintaining the liquid under a steady pressure of gas. The effect of an increase in speed of stirring is to shorten the time of carbonation enormously, and at the same time to increase the degree of impregnation. In an efficiently carbonated water the gas content, after the first opening of the bottle, closely approximates Henry's law. The degree of impregnation of a liquid with a gas is not directly indicated by the "initial pressure," that is, the pressure of the gas over the free surface of the liquid before the first opening of the bottle. The length of time that the carbonated water is allowed to stand before opening bears a marked relation to the maintenance of the supersaturated condition after the pressure in the gas cushion is released. This effect is evidently due to the gradual solution of fine gas bubbles retained on the inner surface of the container. By "blowing off" of the foreign gases in the gas cushion, a higher degree of carbonation can be secured. This principle has been used by practical men in the trade. A high degree of carbonation may be obtained using distilled water alone as a solvent, and if this product is allowed to stand for a period before opening the  $\text{CO}_2$  is retained remarkably well.

**Distilling Head.** O. Stearns. (*J. Ind. Eng. Chem.*, 1917, 9, 972.) The accompanying drawing explains the construction. The angle between  $h$  and  $i$  should be about  $110^\circ$ . This head was specially designed for and found exceptionally efficient in distilling troublesome fluid extracts. Such liquids often give rise to a good deal of froth which carries some of the liquid along and renders redistillation necessary. Sometimes, however, the liquid is forced up by spurts, or again rises in a body, passing into the apparatus connected with the flask. In the first instance the part of the head that does the most service is the

lobes *f, f'* in which the bubbles readily break by expansion and condensation. Bubbles often broke in passing the circular



edge *g, g'* at the lower end of the conical branch of the connecting tube, while the larger opening, across *g, g'*, is less favourable for the entrance of bubbles than a smaller one. The opening *e* in the lower part of bulb is directly over the drainage hole *c* and the reaction produced when the liquid spurts has a tendency to check or force back the ascending liquid. In case the tube *d* becomes submerged, a small siphonic force is generated which tends to empty the bulb. It

is possible that this head may be adapted on a different scale for other similar purposes.

**Douglass's Tonic Mixture for Birds and Poultry.** (*Drugg. Circ.*, 1918, 72, 124.) This mixture, used as a tonic for birds, particularly during the moulting season, is prepared as follows: Iron sulphate, 120 grains; diluted sulphuric acid, 15 minims; water, 8 oz. Dissolve the sulphate in the water and add the acid. A teaspoonful of this mixture is to be added to each quart of the drinking water of the birds.

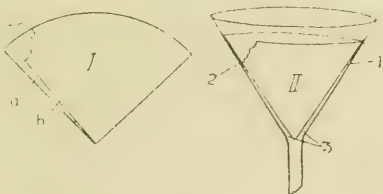
**Eyebrow Pencils.** (*Drugg. Circ.*, 1918, 62, 27.) A good basis for eyebrow pencils, as well as for stick cosmetics, may be made according to the following formula: White wax, 12; ceresin, 3; petrolatum, 4; wool-fat, 4; olive oil, 6; pigment, q.s.; talc, q.s. Melt the white wax and ceresin together, add the petrolatum and wool-fat, and when all are melted incorporate the oil. The colouring substance should be triturated with powdered talc, after which it is to be incorporated with the

fatty mixture. The whole should then be cast into suitable moulds. Sienna, umber, carmine, animal charcoal, lampblack, and many of the anilines, as eosin, rhodamin, may be employed for colouring.

### Filter Paper, Folding and Adjusting, for Rapid Filtration.

H. A. Noyes. (*Chemist Analyst*, 1917, [23], 18.) The following illustrated method of folding and placing quantitative filter papers in funnels has been of much practical use. Instead of folding the paper in the usual way and adjusting it to the funnel after wetting, the filter paper is folded as shown in Figure I. The amount the paper is folded by (*a*) depends on the funnels used. The amount shown is found satisfactory for most funnels. The corner is torn off so that when placed in the funnel the crease (*b*) has no chance of drawing in air which lessens the rate of filtration. Figure II shows a paper folded in this way properly placed in a funnel.

When so placed about 300 c.c. of filtrate is possible per minute. The rate of filtration is thought to be due to: The good contact between the paper and the funnel shown by 1 in Figure



II. The absence of a fold of paper extending to the top which prevents air being sucked along down the side of the filter shown by 2 in Figure II. The increased filtration pull due to the point of the filter being centred over the outlet but not touching the sides of the funnel shown by 3 in Figure II.

**Finger Cracks, Treatment of.** C. J. B. Johnson. (*Brit. Med. Journ.*, 1918, 1, 137.) Heat a piece of cobblers' wax and fill the crack with it. One application is generally sufficient. The objection to it is the dirty appearance. As a preventive the hands should be thoroughly rubbed with vaseline or oil before washing. Another correspondent uses a solution of celluloid (old photographic film, well cleaned). Dissolve in  $\text{Et}_2\text{O}$  and thin down with amyl acetate. The crack must be perfectly dry, and be kept on the stretch (gaping) till repeated coats of the solution have dried in and filled it up. The essential point is not to bridge over the crack, and still less to draw its sides together, but to fill it up solidly from the bottom. If well done, it should last, in spite of free use of the finger, washing,



etc., till the skin outgrows the crack. Only in extreme cases need a few fibres of cotton wool be added. This solution adheres better than collodion.

**Finger Marks, To Remove, from Paper.** (*Nat. Drugg.*, 1918, 48.) (1) Pour benzene on MgO until it becomes a crumbling mass, and apply this to the spot, rubbing it in lightly, with the tip of the finger. When the benzole evaporates, brush off, any dirt that remains can be removed by using a piece of soft rubber. (2) If the foregoing fails, the following is recommended: Make a hot solution of NaOH 3 to 5 per cent. in distilled water, according to the age, etc., of the stain. Have prepared some pieces of heavy blotting paper somewhat larger than the spot to be removed; also, a blotting pad, or several pieces of heavy blotting paper. Lay the soiled face downward on the blotting pad, then saturating one of the pieces of blotter with the hot NaOH solution, put it on the stain and go over it with a hot smoothing iron. If one application does not remove all the grease or stain, repeat the operation. Then saturate another piece of the blotting paper with a 4 per cent. or 5 per cent. solution of HCl in distilled water, apply it to the place, and pass the iron over it to neutralize the NaOH. This process will instantly restore any faded writing or printing, and make the paper bright and fresh again.

**Finger-stalls, Sterile Substitute for.** A. Blaschko. (*Deut. med. Wochschr.*, 42, 390, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 43.) Under the name sterilin, a solution of acetylcellulose in acetone has been introduced. When poured on the hand, in a short time it forms a fine, impenetrable, non-sticky, and resistant film. This fluid, to which different antiseptics can be added, serves as a sterile covering for the hands in operations. From it excellent finger-stalls can be prepared.

**Flash Powder.** E. Wedekind and G. Krebs. (*Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 885.) Flash powders now on the market burn with the evolution of more or less smoke, and the rate of combustion is as a rule too low. Finely divided rare earth metal, such as Zr, Th, Ti, with admixture of definite amounts of the corresponding nitrates or perchlorates, form a pure spectral flash powder which is absolutely odourless and smokeless, and which burns so rapidly that sharp images may be recorded on the plate of objects in very rapid motion. For

instance, 3 parts of pulverulent Zr, produced by the reduction of  $\text{ZrO}_2$  with metallic Ca *in vacuo*, are intimately mixed with 4 parts of  $\text{Zr}(\text{NO}_3)_4$  dried at  $160^\circ$ , and passed through a fine sieve. This powder is the subject of a German patent.

**Fleas, Tobacco Leaves as Poison for.** S. Mallanah. (*Indian Med. Gaz.*, through *Lancet*, 1918, **194**, 644.) It is claimed that tobacco leaves, spread on the floor of sleeping apartments, will kill fleas. The leaves may be stitched into pieces of matting and laid on the floor. This method has been employed by the author to destroy fleas in plague-infected districts in India. It is said to have been so effective that if generally adopted plague might be stamped out. The method is worthy of trial even when the flea is not a possible bearer of the plague bacillus. (See also *Y.B.*, 1916, 399; 1917, 303, 313.)

**Flies and Putrefaction, Prevention of Nuisances from.** F. W. Forman and G. S. Graham Smith. (*J. Hygiene*, 1917, **15**, 109, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 157.) For killing ova and larvae of dipterous flies in decomposing animal matter tar oil and specially creosote oil are the most satisfactory agents. Adult flies may also be kept out of habitations by the repellent properties of the coal tar oils, and flies sprayed therewith are killed. For deodorizing carcasses or preventing the putrefactive decomposition, the use of crude tar creosote oils is cheapest and most effective. This should be used undiluted and applied directly to the carcasses.

**Fly Poisons for Outdoor and Hospital Use.** A. A. Jackson and H. M. Lefroy. (*Bull. Entomol. Research*, 1917, **7**, 327, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, **12**, 70.) Experiments with a large number of inorganic and organic compounds indicate that there are substances other than those containing As which can be used to poison flies. These may not be effective in areas like France and England where flies can get abundant food, but they may be very effective as outdoor poisons in Mesopotamia and Egypt. Na and  $\text{NH}_4$  fluorides, K and Na iodates, K and Na salicylates and  $\text{FeCl}_3$  gave the most encouraging results and have the advantage of being non-toxic. They are excellent to employ in hospitals when used at 1:100 strength in sugar solutions.  $\text{HCHO}$  is uncertain in its killing effect on flies and should not be used when any of the above substances are at hand. (See also *Y.B.*, 1917, 401.)

**Formulae Proposed for A.P.A. Formulary.** (*J. Amer. Pharm. Assoc.*, 1917, 7, 643, 729, 823.) *Pasta Ichthyolis Composita*. *Pasta Ichthamolis Composita*. *Compound Ammonium Ichthosulphonate Paste*.—Ammonium ichthosulphonate, 25 Gm.; phenol, 2.5 Gm.; starch, in powder, 50 Gm.; distilled water, warm, 22.5 c.c. Dissolve the ammonium ichthosulphonate and phenol in the warm water, and mix with the starch. To be painted on the skin and allowed to dry.

*Pasta Iodi et Amyli*. *Pasta Amyli Iodata*. *Tilbury Fox Paste*.—Starch, in powder, 10 Gm.; glycerin, 20 c.c.; Lugol's solution of iodine, 10 c.c.; distilled water, to make 100 Gm. Boil together the starch, glycerin, and distilled water; cool, and add the solution of iodine; add sufficient water to produce 100 Gm. and mix well. Applied on lint to syphilitic sores and ulcers.

*Pasta Potassae et Calcis*, *Vienna Paste*.—Potassa with lime, N.F. IV; alcohol, sufficient to make a paste. This paste was formerly used as a caustic for malignant growths. In place of alcohol, glycerin is sometimes used.

*Pasta Sodae et Calcis*, *London Paste*.—Soda with lime, N.F. IV; water, sufficient to make a paste. Said to be a less painful application than Vienna paste. Both London and Vienna pastes should be freshly prepared when needed.

*Pasta Zinci et Gelatini*, *Gelatinum Zinci*, *Unna's Paste*.—Gelatin, 15 Gm.; distilled water, 35 c.c.; zinc oxide, 15 Gm.; glycerin, 35 Gm. Soften the gelatin by soaking in the water; then add the glycerin and zinc oxide, previously rubbed together to a smooth paste. Heat the mixture on a water bath, stirring until the gelatin is dissolved and a product of uniform consistence is obtained. Pour into a flat dish or tray to solidify. When required for use, this paste is melted on a water bath, and applied to the skin with a stiff brush; the part may then be covered with cotton wool or lint.

*Pasta Zinci et Ichthyolis*, *Gelatinum Zinci et Ichthyolis*.—Zinc oxide, 10 Gm.; ammonium ichthosulphonate, 2 Gm.; gelatin, 16 Gm.; glycerin, 32 Gm.; distilled water, to make 100 Gm. Soften the gelatin by soaking in water, then add the glycerin, zinc oxide, and ammonium ichthosulphonate, previously rubbed together to a smooth paste. Heat on a water bath till the gelatin is dissolved and the product is of uniform consistence. Pour into a flat dish to solidify. This paste is used for the same purposes as *Pasta Zinci et Gelatini*.

*Anthrasol Dusting Powder.*—Anthrasol, 5 Gm.; zinc oxide, 50 Gm.; talc, 50 Gm.

*Anthrasol Hair Tonic.*—Anthrasol, 3 c.c.; glycerin, 5 c.c.; oil of neroli, 5 drops; tincture of soft soap, 30 c.c.; alcohol, to make 150 c.c.

*Euresol Hair Lotion.*—Euresol, 8 c.c.; mercuric chloride, 0.24 Gm.; spirit of formic acid N.F., 30 c.c.; castor oil, 4 c.c.; alcohol, to make 200 c.c. Apply to scalp every morning against dandruff and baldness. (Euresol is resorcinylic acetate.)

*Euresol Hair Tonic.*—Euresol pro capillis, 10 c.c.; alcohol, 125 c.c.; distilled water, to make 250 c.c. If the scalp is very dry, it is advisable to add 5 c.c. of liquid petrolatum to this hair tonic, or to use euresol hair pomade.

*Euresol Hair Pomade.*—(1) White ceresin, 25; coconut oil, 75; euresol, 5. Melt the ceresin and coconut fat; when cool, add the euresol. (2) Euresol, 5; pomade ointment, 45.

*Pomade Ointment (Unna).*—Cacao butter, 10 Gm.; oil of sweet almonds, 20 Gm.; otto of rose, 1 drop.

*"Pins" Cough Mixture.*—Paregoric, syrup of ipecacuanha, spirit of nitre, syrup of squill, equal parts. The name indicates the initials of the four ingredients.

*Tooth Powder (New York Health Board).*—Powdered orris, 4; powdered Castile soap, 15; precipitated chalk, 60.

*Laxative Confection: Household Physic.*—Prunes, dates, sultana raisins, figs, of each, 120; pulp and add powdered senna, 30.

*Linimentum Capsici Co., Liquor Capsici Compositus.*—Capsicum, ground, black pepper, ground, of each 100; soft soap, camphor, of each, 25; alcohol, 90 per cent., 800; eugenol, oil of rosemary, of each 5; oil of cinnamon, 1; ammonia water, 200. Macerate the first four ingredients in the alcohol during 8 days, then express and filter and add the other ingredients.

*Orris Root and Chalk.*—Powdered orris root, 1; precip. calcium carbonate, 9.

*Linimentum Capsici Co., Pain Expeller.*—Solution of Ammonia, oleo-balsamic mixture N.F., spirit of camphor, soap liniment, of each 15; tincture of capsicum, 10; alcohol 90 per cent., 30; tincture of caramel, N.F., sufficient to colour.

*Tinctura Dentifricia, Eau Dentifrice du Dr. Pierre.*—Star anise, bruised, 7.5 Gm.; oil of peppermint, oil of star anise, of each 25 drops; scarlet red, 0.01 Gm.; alcohol 90 per cent.,



100 Gm. Macerate for about a week, and filter. (See also *Y.B.*, 1916, 404 ; 1908, 279.)

*Tincture of Red Saunders.*—Red Saunders, powdered, 1 ; alcohol 90 per cent., 5.

*Eau de Botot : Botot's Dentifrice.*—Orris root, cut, 50 ; cassia cinnamon, ground, star anise, bruised, clove, bruised, galangal, N.F., cut, of each 25 ; cochineal, powdered, 10 ; tannic acid, 5 ; oil of peppermint, 10 ; balsam of Peru, 5 ; coumarin, 0.1 ; oil of neroli, 0.75 ; oil of rose, 0.5 ; diluted alcohol 68 per cent., 1000. Macerate during 3 days, press and filter.

*Salicyl-Vanillin Dentifrice.*—Oil of peppermint, 2 ; oil of cinnamon, 0.5 ; salicylic acid, 2.5 ; vanillin, 1.5 ; tincture of Red Saunders, 50 ; alcohol 90 per cent., 500 ; water, to make 1000.

*Salol Dentifrice, Odol Substitute.*—Oil of caraway, oil of clove, of each, 0.4 ; oil of peppermint, 5.0 ; saccharin, 0.04 ; salol, 25 ; tincture of Red Saunders, 50 ; alcohol 90 per cent., to make 1000.

*Thymol Dentifrice.*—Thymol, 1 ; botot's dentifrice, 99.

*Pasta Dentifrica Kalii Chlorici, Unna's Potassium Chlorate Tooth Paste.*— $\text{KClO}_3$ , powdered, 5 Gm. ; precipitated chalk, orris root, powdered, soap, powdered, of each 25 Gm. ; glycerin, q.s. ; oil of peppermint, 20 drops. Use enough glycerin to mass.

*Balneum Sulphuratum Inodorum, Sulfurine.*— $\text{Na}_2\text{CO}_3$ , dry, 92 Gm. ; sublimed sulphur, 4 Gm. ;  $\text{K}_2\text{CrO}_4$ , 1 Gm. ; distilled water, 3 c.c. Dissolve  $\text{K}_2\text{CrO}_4$  in the water and mix well with other ingredients. Then melt the mass in a covered crucible, which is only about half filled. Pour the fused mass on a cold marble slab, and after cooling break the finished product into pieces and preserve in well-closed bottles.

*Balsamum Mammillare, Nipple Balsam.*—Benzoic acid, 1 Gm. ; tannic acid, 5 Gm. ; glycerin, 5 Gm. ; alcohol 94 per cent., 20 Gm. ; rose water, 75 Gm. Dissolve and filter.

*Nipple Wash.*—Alum, powdered, 30 Gm. ; tincture of galls, 30 c.c. Triturate well.

*Pulvis Haemorrhoidalis.*—Calcined magnesia, washed sulphur, potassium bitartrate, senna, powdered, sugar, powdered, equal parts. Mix well.

*Oleum Nigrum, Black Oil, Farrier's Oil, Currier's Oil, Fuming Oil.*—Oil of turpentine, linseed oil, of each 500 c.c. ; sulphuric acid, 30 c.c. Mix the oils and gradually and with constant stirring add the  $\text{H}_2\text{SO}_4$ . Great care must be used when

this is done, and the operation must be conducted in an open vessel.

*Elaeosaccharum Cumarini, Coumarin Sugar*.—Coumarin, 1 Gm.; sugar, in fine powder, 999 Gm. Triturate well and keep in tightly stoppered bottle.

*Elaeosaccharum Vanillini, Vanillin Sugar*.—Vanillin, 3 Gm.; sugar, in fine powder, 97 Gm. Triturate well and keep in tightly stoppered bottle.

*Wright's Surgical Antiseptic Solution*.—Sodium citrate, 10 Gm.; NaCl, 40 Gm.; distilled water, to 1000. Dissolve, filter, and sterilize by boiling for 30 minutes.

*Senn's Solution*.—I, 10; KI, 10; distilled water, to 1000.

*Ung. Album*.—ZnO, 100; white wax, 25; phenol, 2; white petrolatum, to make 100.

*Gray's Cough Mixture*.—AmCl, 60 Gm.; dilute hydrocyanic acid, 8 c.c.; CHCl<sub>3</sub>, 6 c.c.; syrup of lactucarium, to make 1000 c.c.

*Syrup. Eridictyi: Syrup of Yerba Santa*.—Fluid extract of yerba santa, 30 c.c.; K<sub>2</sub>CO<sub>3</sub>, 6 Gm.; water, 15 c.c.; syrup, to make 500 c.c. Dissolve the K<sub>2</sub>CO<sub>3</sub> in the water; add this to the fluid extract, then add the syrup.

*Tinct. Angelicae*.—Angelica root, cut, 100 Gm.; alcohol 68 per cent., 500 Gm.

*Tinct. Anticholerica, Cholera Drops*.—Oil of peppermint, 2 c.c.; tincture of cascarrilla, 8 c.c.; tincture of opium, 10 c.c.; tincture of krameria, 20 c.c.; ethereal tinct. of Valerian, 30 c.c.; aromatic tincture N.F., 30 c.c.; to make 100 c.c. Mix, set aside for 3 days, and then filter.

*Tinct. Aromatica Acida, Elixir Vitrioli Mynsichti*.—Cinnamon, 50 Gm.; ginger, 20 Gm.; galanga, cardamom, clove, of each 10 Gm.; hydrochloric acid, 20 Gm.; EtOH 68 per cent., 500 Gm. Macerate the ground drugs in the liquids and prepare a tincture.

*Tinct. Condurango*.—Condurango, cut, 100 Gm.; EtOH 68 per cent., 500 Gm.

*Tinct. Aurantii Fruct. Immaturi, Tincture of Orange Apples*.—Orange apples, ground, 100 Gm.; EtOH 68 per cent., 500 Gm.

*Tinct. Carminativa, Tinct. Calami Composita*.—Zedoary, cut, 16 Gm.; calamus, cut, 8 Gm.; galanga, cut, 8 Gm.; anthemis, ground, caraway, ground, anise, ground, of each 4 Gm.; laurel berries, ground, clove, ground, of each, 3 Gm.;

mace, ground, 2 Gm.; bitter orange peel, ground, 1 Gm.; EtOH 68 per cent., 100 Gm.; peppermint water, 100 Gm. Prepare by maceration. Before dispensing add: Spirit of nitrous ether, 10 per cent.

*Tinct. Castorei*.—Castor, in coarse powder, 100 Gm.; EtOH 90 per cent., 1000 Gm. Prepare by maceration.

*Tinct. Castorei Aetherea*.—Castor, in coarse powder, 100 Gm.; Et<sub>2</sub>O, 250 Gm.; EtOH 90 per cent., 750 Gm. Prepare by maceration.

*Tinct. Chinoidini*.—Chinoidin, in coarse powder, 20 Gm.; EtOH 68 per cent., 170 Gm.; HCl, 10 Gm. Prepare by maceration.

*Tinct. Coccinellae*.—Cochineal, in coarse powder, 100 Gm.; EtOH 90 per cent., 1000 Gm. Prepare by maceration.

*Tinct. Galangae*.—Galanga, cut, 100 Gm.; EtOH 68 per cent., 500 Gm. Prepare by maceration.

*Tinct. Guaiaci Ligni*.—Guaiac wood, cut, 100 Gm.; EtOH 68 per cent., 500 Gm. Prepare by maceration.

*Tinct. Kalina, Tincture of Potassa, Kalitinktur*.—KOH, 10 Gm.; dehydrated EtOH, 60 Gm. Dissolve.

*Suppositoria Haemorrhoidalia, Pile Suppositories*.—Bismuth subiodide, 1.0 Gm.; bismuth subgallate, 1.0 Gm. ZnO, 1.0 Gm.; resorcinol, 0.1 Gm.; Peruvian balsam, 0.5 Gm.; cacao butter, 26.4 Gm. Mix and divide into rectal suppositories, weighing 3 Gm. each.

*Suppositoria Antihaemorrhoidalia, Anusol Style, Lux*.—Bismuth iodotannate, 3.75 Gm.; bismuth resorcinate, 3.75 Gm.; ZnO, 6.00 Gm.; Peruvian balsam, 1.5 Gm.; cacao butter, 19 Gm.; wax ointment, Ph.G.V., 2.5 Gm. Mix and divide into twelve suppositories.

*Suppositoria Hamamelidis*.—Pilular extract of hamamelis, 1 Gm.; cacao butter, 19 Gm. Mix and divide into ten suppositories.

*Suppositoria Ol. Theobrom. c̄ Glycerin*.—Glycerinated gelatin, 1; cacao butter, 2. Melt together, and pour into suitable moulds.

*Tinct. Ferri Aromat*.—Dialysed solution of iron, 63 Gm.; syrup, 300 Gm.; solution of NaOH (4.5 : 100), 10.5 Gm.; EtOH 90 per cent., 165 Gm.; tincture of sweet orange peel, 3 Gm.; aromatic essence, 1.5 Gm.; tincture of vanilla, 1.5 Gm.; acetic ether, 5 drops; distilled water, to 1000 Gm. Mix the dialysed iron with the syrup; add at once a dilution of the NaOH solu-

tion with 26.5 c.c. of water. Agitate well, add the remaining (429 Gm.) of water and the other ingredients. Should contain not less than 0.2 per cent. of Fe.

*Tinct. Aromat. Amar.*—Aromatic tincture N.F., bitter tincture N.F., equal volumes.

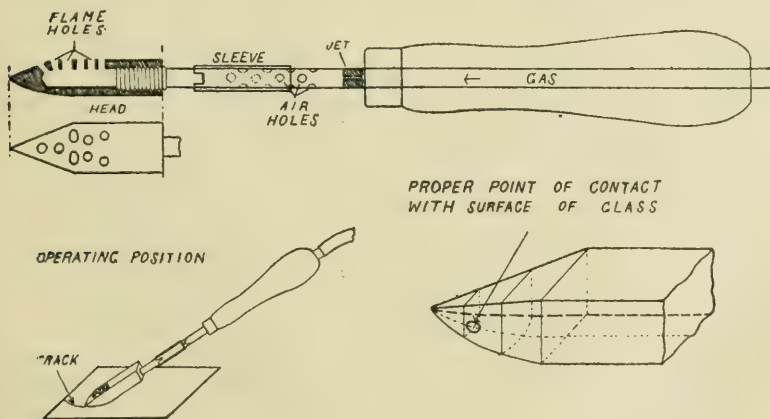
*Tinct. Cascarillae.*—Cascarilla bark, 1; EtOH 68 per cent., 5.

*Spirit. Aromat. Aromatic Essence.*—Coriander, 50 Gm.; nutmeg, cinnamon, marjoram, cloves, of each, 25 Gm.; EtOH 90 per cent., 750 Gm.; water, 850 Gm.; to make 1000 Gm. Macerate with the EtOH and water for 24 hours, then distil to obtain 1000 Gm. Sp.g. 0.885 to 0.895.

*Tinct. Ferri Co.* (Aethenstaedt).—Saccharated ferric oxide N.F. IV, 70 Gm.; distilled water, 370 Gm.; syrup, 240 Gm.; EtOH 90 per cent., 160 Gm.; aromatic tincture N.F., 1.5 Gm.; tincture of sweet orange peel, 3 Gm.; tincture of vanilla, 1.5 Gm.; acetic ether, 5 drops. Dissolve the saccharated  $\text{Fe}_2\text{O}_3$  in the water and add the other ingredients. Dose: A tablespoonful three times a day.

**Fruits, Influence of Sugar in the Cooking of.** R. Berg. (*Muench. med. Wochschr.*, 1917, 64, 1169, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 835.) Boiling fruit with water and sugar lessens the amount of acid (citric, tartaric, malic) determined. This is due to formation of lactones, or possibly to the formation of esters between the acids and sugar. The effect is counteracted by the addition of rice starch.

**Glass Cutting Tool.** K. H. Parker. (*J. Amer. Chem. Soc.*, 1918, 40, 195.) The tool consists of a small hollow head of





brass or copper in which ordinary gas is burned, which is brazed or screwed on to a metal tube, through which the gas is supplied. The flow of gas should be regulated so that the flame will "strike back" and burn within the head. The diagram explains itself. The crack is started with a diamond or file scratch and led in the desired direction with the hot, pointed end of the tool. The shape indicated has given the best results. With the head of the tool constantly red hot, it is an easy matter to cut glass into almost any shape desired.

**Glassware, American and European.** P. H. Walker and F. W. Smither. (*J. Ind. Eng. Chem.*, 1917, **9**, 1090.) Five makes of American glassware "Pyrex," "M.E.G. Co.," "Non-sol.," "Fry," and "Libbey" were tested with regard to the action of water, acids, alkalis and alkali carbonates, heat shock and mechanical shock. All were found to be superior to both "Jena" and "Kavalier" European glass.

**Indelible Ink, Violet Blue.** (*L'Union pharm.*, through *Nat. Drugg.*, 1917, **47**, 436.)  $K_4FeCy_6$ , 6; strong AmOH, 4; tartaric acid, 4; distilled water, 500. Dissolve the solids in the distilled water; filter out the  $KHC_4H_4O_6$ , which forms more or less rapidly. To the clear filtrate add the following solution: Ammonio-citrate of iron, 320; strong AmOH, 80; aniline blue, 16; gum acacia, 140. Upon writing with this ink, it traces in a yellow violet, but in a short time turns to a bright bluish purple.

**Kapok as a Material for Dressings.** J. Silhol. (*Comptes rend.*, 1918, **166**, 52.) Since kapok is furnished by all the French tropical colonies, whereas cotton is chiefly of foreign origin, and kapok is about four or five times lighter than cotton, its use as a dressing is suggested. Raw kapok absorbs wound secretions, fixes blood corpuscles and microbes. It serves therefore admirably as a protective covering for wounds. It has not yet been rendered completely absorbent to water by treatment. (See also *Y.B.*, 1908, 296.)

**Lambs' Wool Cream.** Powdered Castile soap, 2 drachms; powdered borax, 1 drachm; wool-fat, 7 drachms; coconut oil, 3 drachms; water, 7 fl. drachms. Rub together continuously for 15 minutes and then add gradually and with constant stirring: Rose water, heated to 40°C., 10 fl. oz.; perfume, as desired.

**Larvicide of Fine Vegetable Powders for Mosquito Larvae.**

**J. K. Thibault.** (*J. Amer. Med. Assoc.*, 1918, **70**, 1215.) Any very fine vegetable powder, scattered in a thin film over the surface of the water, will act mechanically as a larvicide for the larvae of *Anopheles* and other aquatic surface-breathing diptera. Powdered insect flowers is most effective, but the dried powdered leaves of local weeds or grasses are also quite efficient. The powder acts for a limited period, only while it floats as a dry film on the surface of the water. It is cheaper than oil, and may be used in cases where oil is not suitable or not readily procurable at the time of the appearance of the larvae.

**Leaves, Fallen, as a Source of Paper Pulp.** **K. Bramson.** (*Comptes rend.*, 1918, **166**, 853.) Dead leaves are stated to afford a practicable and valuable source of cellulose pulp for paper making. In view of the probable scarcity of wood pulp after the war, it is most desirable that this source of paper pulp should be utilized. It is estimated that the French forests could be made to yield from 35 to 40 million tons of fallen leaves a year. The normal paper requirements of the country could be met with 4 million tons. The leaves can easily be collected and compressed for transport. They are then crushed and separated into fibre and powder. The fibre is the part used for pulping. It is treated with alkali, and washed and bleached as in making wood pulp. The powder is submitted to destructive distillation, when it yields a very pure porous charcoal, tar, pyroligneous acid and acetone. A thousand kilos (1 ton) of dried leaves yields 250 kilos of paper pulp, 200 kilos of charcoal, 30 kilos of tar, 1 kilo of pyroligneous acid, and 600 Gm. of acetone.

**Lice, Oily or Fatty Inunction as a Protection against.** **G. Homan.** (*J. Amer. Med. Assoc.*, 1918, **70**, 1393.) Smearing the body with fat or oil is stated to be an effective protection against lice, and against typhus and the other diseases they may convey. A combination of castor oil and tallow is suggested, or petroleum products may be found to be effective. (See also *Y.B.*, 1915, 358; 1917, 313.)

**Lilac Toilet Water.** **H. C. Muldoon.** (*Bull. Pharm.*, 1917, **31**, 464.) Terpeneol,  $1\frac{1}{2}$  oz.; oil of rose,  $\frac{1}{2}$  drachm; oil of neroli,  $\frac{1}{2}$  drachm; tincture of benzoin, 2 drachms; orange flower water, 10 oz.; alcohol, 95 per cent., 48 oz.; colour, q.s. (See also *Y.B.*, 1912, 362.)

**Liquid Paraffin and Cacao Butter as a Dietetic Mixture.** F. P. Weber. (*Lancet*, 1918, **194**, 458.) Cacao butter, 34, is melted, and liquid paraffin, 66, is stirred in. The mixture takes a long time to set, sometimes over 24 hours, unless it is artificially cooled. When set, it has approximately the consistence of butter. This forms an agreeable method of administering liquid paraffin and, incidentally, furnishes a partial butter substitute.

**Metal Polishing Cream.** (*Drugg. Circ.*, 1918, **62**, 218.) Solution of sodium silicate, 5 lb.; oleic acid, 5½ lb.; kerosene, enough; kieselguhr, enough; oil of citronella, enough; methyl salicylate, enough. Heat the oleic acid almost to boiling in a place remote from the open flame, preferably out of doors; heat separately the solution of sodium silicate; pour the latter gradually into the former with constant stirring, and when the mixture is cooled to below 100° F. stir in sufficient kieselguhr previously made into thin cream with kerosene. Finally add the odorous substances and mix well.

**Microscopical Work, Absolute Alcohol, MeOH and Terpeneol for.** H. Garnett. (*Pharm. J.*, 1918, [4], **46**, 127.) *Absolute Alcohol*.—For dehydrating purposes it is well known that the EtOH must be practically absolute for efficient work. Yet it speedily deteriorates by absorption of moisture. A simple test available for the microscopist, enabling him to assure the strength of the EtOH used, is afforded by the solubility of pure "cedar" wood oil. The pure, unthickened oil of *Juniperus virginiana* gives a clear solution at 15.5° C. with EtOH 98.2 per cent. and over, but not with weaker spirit.

Weak EtOH may be readily dehydrated for micro work by digesting with it a few particles of calcium carbide in a warm place for 3 days. Some acetylene is evolved and the EtOH becomes practically anhydrous. It acquires a slight disagreeable odour, but this is immaterial for the purpose for which it is used.

*Methyl Alcohol*.—In view of the prevailing scarcity of MeOH, experiments have been made to determine if EtOH cannot be substituted therefor. In the case of Delafield's haematoxylin stain, the original formula for which requires both absolute MeOH and EtOH, it is found that the MeOH serves no useful purpose, and that a perfectly efficient stain can be made with absolute EtOH alone. In the case of Leishman's blood stain,

however, absolute EtOH is not so good a solvent for the dry stain as MeOH, therefore the latter must still be employed.

*Terpineol as a Clearing Agent.*—Terpineol is an excellent clearing agent, especially for celloidinized material, and preferable to the more costly bergamot oil which has been used for the purpose of clearing before the final mounting in balsam. It is better also than clove oil, which tends to decolorize some stains. Terpineol is not liable to oxidation, and mixes clear with EtOH as weak as 70 per cent. Some kinds are somewhat viscous: these may be thinned down with xylol.

**Mixed Kitchen Spice.** (*Nat. Drugg.*, 1918, 48, 107.) Ginger, 4 oz.; cinnamon, 2 oz.; black pepper, 2 oz.; nutmeg, 2 oz.; allspice, 2 oz.; clove,  $\frac{1}{2}$  drachm; table salt, 24 oz. Reduce the spices to a fairly fine powder; mix well with the salt.

**Mosquito Larvae, Method of Oiling Ponds to Destroy.** (*B.M.J.*, 1918, 1, 360.) The potential re-introduction of malaria germs into this country has directed increased attention to the desirability of destroying blood-sucking gnat or "mosquito" larvae, and specially the larvae of the genus *Anopheles*. The following practical details may be of service: Crude petroleum (kerosene or "paraffin oil"), or other oil which will make a fairly stable film, will quickly destroy these larvae in stagnant water. Half a pint of petroleum is sufficient for 100 square feet of surface. It should be sprayed on, or failing a sprayer, a sack soaked in the oil, weighted with a stone, may be thrown into the centre of the pond. It may also be applied by dripping from a tin with a minute aperture. This method is useful for automatic re-application in slowly moving water, or at the windward edge of a pond. Theoretically once a week should be enough, but in practice oiling is not a success unless it is done three or four times weekly.

**Mouth Washes and Dentifrices, Formulae for.** (*Brit. and Colon. Pharm.*, 1917, 71, 9.) *Tannin and Eau de Cologne.*—R Acid tannic,  $\bar{3}$ ij.; eau de Cologne ad  $\bar{3}$ vi. Dissolve, allow to stand for 7 days, then filter.

*Benzoin and Tannin.*—R Benzoin,  $\bar{3}$ ij.; eau de Cologne,  $\bar{3}$ vi. Macerate 7 days, strain through muslin, and add to strained liquor: Acid. tannic,  $\bar{5}$ i. Dissolve, allow to clarify, decant.

*Glycerole of Myrrh and Borax.*—R Myrrh (in coarse powder), 15 grains: pulv. boracis, 22 grains; glycerin et aq. dest., āā



3i. Mix, boil in a flask for 10 minutes, cool, strain through muslin; add sufficient of a mixture of glycerin and distilled water to make 6 fl. oz. Clarify and decant.

*Compound Tincture of Orris*.—R Tinct. iridis, 3i. (4 oz. ad O i s.v.t.); ol. neroli, ℥v. Filter.

*Gaultheria Tincture*.—R. Ol. gaultheriae, ℥xx.; sp. vini rect., 3iv.; aq. dest., ad 3vij.; soln. carmine, ℥v. M.s.a., filter.

*Compound Tincture of Myrrh*.—R Eau de Cologne, 3x.; tinct. rhatan, 3iij.; tinct. myrrh, 3x. Mix.

*Carbolic Tincture*.—R Acid carbolic, 3i.; rad. anchus. contus., 3i.; sp. vini rect., q.s. to make 3x.; ess. millefleur 3ss. Macerate 7 days, then filter.

*Detergent Tincture*.—R Tinct. benz. simp., 3iiss.; tinct. kramer, 3iiiss.; chloroform, ℥xlv.; otto rose, ℥v.; ol. neroli, ℥v.; glyc. boracis, 3ij.; aq. dest., 3iv.; sp. vini rect., ad 3xx. Mix. Stand 7 days. Filter.

*Preservative Tincture*.—R Acid tannic, 3i.; tinct. pyrethri, 3i.; syr. simplic., 3ij.; tinct. aurant., tinct. myrrh, tinct. kramer, āā 3iij.; glyc. boracis, 3i.; aq. cologn., 3v.; sp. vini rect., 3vij.; aq. dest., 3iv. Misce. Stand 14 days. Filter.

*Tinctures of Myrrh and Borax*.—(1) R Tinct. kramer, tinct. myrrh, eau de Cologne, āā 3i.; mel. boracis, 3ss. (2) R Tinct. myrrh, 3i.; tinct. kramer, 3ss.; glyc. boracis, 3ss.; sp. chlorof., 3ss.; eau de Cologne, ad 3iv. (3) R Tinct. myrrh, tinct. aurant., tinct. kramer, āā 3iij.; glyc. boracis, 3i.; eau de Cologne, 3x.; P. cocc. cact., 3i.; aq. dest., 3iij. (4) R Tinct. myrrh, Oiss.; eau de Cologne, Oss.; aq. lavand., Oss.; cocc. cact., 9i.; pulv. boracis, 3i.; glycerini, 3i. (5) R Gum. myrrh, 3vss.; pulv. catechu pall., 3j.; rass. santal. rub., 3ij.; eau de Cologne, Oi. Digest for 48 hours with occasional agitation, then decant; macerate residue for another 48 hours with 1 pint sp. vini rect., again decant; mix the two solutions, and add: Glyc. boracis, 3iij. Stand 7 days, then filter. (6) R Pulv. boracis, 3iij.; myrrh (in coarse powder), 3iv.; eau de Cologne, Ovii.; aq. rosae, 3xij.; glycerin, 3xij.; ol. ros. geran., 3i.; rad. rhatan., 3i. Macerate for 10 days with occasional agitation, then filter.

*Mouth Washes (various)*.—(1) R Salol, 3iiss.; chlorof. pur., 3i.; tinct. myrrh, 3ss.; tinct. kramer, 3i.; sp. vini rect., ad 3vi.; ol. ylang ylang., ℥x. (2) R Acid. tannic, 3iiss.; acid. carbolic, 3iiss.; camphor, 3iiss.; ol. caryoph., ol. menth.

pip., āā ℥100; ol. anisi, ʒiiss.; ol. gaultheriae, ℥200; tinct. myrrh, ʒiiss.; tinct. iodi., ʒi.; sp. chlorof., ʒiiss.; tinct. kramer, ʒxij.; sp. vini rect., ʒxij. (3) R Inf. ros. acid. cone., ʒiv.; acid boric, ʒi.; ess. ros. alb., ʒss.; aq. rosae, ad ʒiv. (4) R Rad. rhatan, ʒiij.; cocc. cacti, ʒij.; gum. guaiac, ʒi.; gum. myrrh, ʒiij.; rad. iridis, ʒij.; Tonquin beans, No. 18; fruct. anisi, ʒi.; camphor, ʒij.; ol. cinnam., ol. caryoph., ol. menth. pip., āā ʒi.; sp. vini rect., Ovii. Macerate 7 days. Filter. Make final product up to 7 pints with spirit. (5) R Glycerol. myrrh et borac. (as formula No. 3), ʒij.; decoct. quillaiae, ʒiv. (2 oz. ad Oi.); otto rose, ℥vi.; ol. caryoph., ℥vi.; ol. aurant. dulc., ℥vi. (6) R Acid carbolic, 16 Gm.; aether. chlor., 20 Gm.; tinct. rhatan, 30 Gm.; eau de Cologne, 300 Gm. (7) R Thymol., 2·50; acid benzoic, 30·00; menthol, 20·00; tinct. eucalypt., 150·00; ol. gaultheriae, 20·00; sp. vini rect., 1000·00. (8) R Tinct. pyrethri, ʒi.; glycerini, ʒij.; glyc. ac. carbol., ʒvi.; ol. gaultheriae, ol. cassiae, āā ℥xv.; rosanilin HCl, q.s. to colour; sp. vini rect., ʒiij. (9) R Alum. ust., ʒiiss.; tinct. pyrethri, ʒiiss.; eau de Cologne, ʒiiss.; sp. vini rect., ʒiiss.; sacch. ust., q.s.; aq. dest., ad ʒxxx. (10) R Tinct. kramer, ʒij.; acid tannic, ʒss.; glycerini, ʒss.; acid carbolic, ℥v.; aq. rosae, ad ʒviiij. (11) R cocc. cact., ʒvi.; gum. guaiac., ʒi.; gum. benzoin., ʒiv.; acid tannic, ʒiij.; ol. anisi, ʒiij.; ol. caryoph., ʒij.; ol. menth. pip., ʒvi.; ol. gaultheriae, ʒij.; sp. vini rect., Ovss. Macerate 10 days, then add: Pulv. pot. chlor., ʒi.; glycerini, Oi.; aq. dest., Oiss. Dissolve pot. chlor. in the glyc. and water before mixing the two; filter mixture after a further 7 days' standing. (12) R Acid carbolic, ʒiv.; glycerini, ʒxx.; eau de Cologne, ʒiv.; liq. cocci, ʒiv.; aq. dest., ad ʒ160. (13) R Menthol, gr. xv.; B. naphthol, gr. xv.; saccharin, gr. xxx.; ess. cinnam., gr. 3ss.; sp. vini rect., ad ʒiv. (14) R Ol. menth. pip., 25·0; ol. anisi, 25·0; ol. caryoph., 16·0; ol. cassiae, 16·0; cognac, 25·0; coccus cacta, 16·0; potass. bitart., 16·0; alcohol 90 per cent., 4000·0. (15) R Pulv. sapon., B.W., ʒi.; glycerin, ʒi.; tinct. myrrh, ℥30; alcohol, ʒv. M. ft. sol. et adde: Ol. gaultheriae, ℥xx.; ol. caryophyll., ℥i.; ol. menth. pip., ℥v.; sol. carmin., q.s.

**Ointment for Burns.** (*Nat. Drugg.*, 1918, 48, 107.) Ichthyol, 1 oz.; zinc oxide, 2 oz.; prepared chalk, 3 oz.; starch, 3 oz.; linseed oil, 3 oz.; lime water, 4 oz. Apply on lint.

**Popular Formulae.** (*Amer. Drugg.*) *Antiseptic Salve.*—

Thymol iodide, 5 ; phenol, 1 ; menthol, 1 ; zinc oxide ointment, to make 100. This is said to be an excellent salve for drying to old sores.

*Euresol Hair Lotion* (Eliot and White).—Euresol, 8 Gm. ; mercuric chloride, 0.24 Gm. ; spirit of formic acid N.F., 30 c.c. ; castor oil, 4 c.c. ; perfumed alcohol, to make 200 c.c. Apply to scalp every morning against dandruff.

*Dohi's Eczema Ointment*.—Liquid tar, 10 ; washed sulphur, 10 ; zinc oxide, 10 ; benzoated lard, 30. Mix on an ointment slab.

*Chlorazene Ointment*.—White wax, 100 ; olive oil, 200 ; balsam of Peru, 3 ; tincture of benzoin, 3 ; chlorazene, 4.50. Dissolve the chlorazene in the warmed olive oil and in this incorporate the balsam and the tincture. Finally add the wax, melted at a very low temperature.

*Mastisol*.—Powdered mastic, 200 Gm. ; rosin, white, 100 Gm. ; Venice turpentine, 70 Gm. ; linseed oil, 5 c.c. ; methyl salicylate, 1 c.c. ; benzol, 500 c.c. The combination can be effected by simple solution in the benzol. This preparation has been used very successfully as a protective varnish over bandaged surfaces.

*Cucumber Cream*.—White wax, 3 oz. ; spermaceti, 3 oz. ; benzoated lard, 8 oz. ; borax, 150 grains ; grated cucumber, 3 oz. Melt the first three ingredients, add the borax and cucumbers and allow the mixture to cool slowly, making certain that the cucumber gratings are not allowed to settle. After cooling allow to stand a day. Then remelt with careful heating, strain through a fine fabric and stir until cool. Use no perfume that will conceal the cucumber odour.

*Solution of Calcium Acetylsalicylate*.—Calcium acetylsalicylate, 5 to 10 Gm. ; syrup of raspberry, 10 Gm. ; distilled water, 180 Gm. One tablespoonful every 3 hours. The excellence with which this so-called "soluble aspirin" or calcium acetylsalicylate is borne by the most sensitive stomachs has often been called to the attention of prescribers and it is coming into use more than formerly. The above is an ideal way of administering the drug.

*Liquid Rouge*.—Carmine, 45 grains ; ammonia water, 50 minims ; alcohol, 2 fl. oz. ; oil of geranium, 15 minims ; rose water, 10 fl. oz. Triturate the carmine, which must be of a good grade, with the ammonia water ; add the rose water and then the oil dissolved in the alcohol.

*Harbold's Hand Lotion*.—Tragacanth, 2 drachms; quince seed, 15 drachms; boric acid, 8 drachms; glycerin, 10 fl. oz.; alcohol, 10 fl. oz.; sodium benzoate, 3 drachms; boiling water, 80 fl. oz.; water, to make 6 pints, 8 fl. oz. Soften the tragacanth in 32 fl. oz. of water until a homogeneous mixture results. Steep the quince seed in 64 fl. oz. of the boiling water for 4 hours, stirring frequently. Then strain carefully. Dissolve the boric acid and sodium benzoate in the remainder of the hot water and add the glycerin and the alcohol perfumed delicately with rose or violet. To this add the mucilages in small portions, agitating well after this addition.

**Quassia Extract as a Contact Insecticide.** N. E. McIndoo and A. F. Sievers. (*J. Agric. Res.*, 1917, **10**, 497, through *J. Soc. Chem. Ind.*, 1917, **36**, 1146.) Numerous experiments to determine the efficiency of various extracts of Jamaica quassia wood and the effect of these extracts upon aphids are described. Medium-sized quassia chips soaked for 2 hours in water yielded 60 per cent. of their total soluble matter, and during a second extraction, 15 per cent. Extraction for 24 hours did not increase the yield. The first extract was slightly more effective than the second in killing aphids. If the chips are boiled for 4 hours the yield of extract is half as much again. The yield of extract is greater the larger the volume of water used: 3 Gm. of chips yielded one-third more extract to 3 litres of water than to a quarter litre. The solubility of commercial quassiin powder is 1 in 3000 of water, and 3–5 times as much in very dilute alkali and soap solutions. In testing the various extracts obtained upon aphids, it was found that soap solution extract, prepared at ordinary temperature, was the most effective and economical. Commercial quassiin powder contains quassol, an inert and tasteless substance, and quassiin, an effective insecticide and intensely bitter. Exhalations from quassiin powder killed aphids, as also did the powder itself when dusted on them, whereas quassia powder and chips were ineffective. Quassia and quassiin spray solutions kill aphids when applied sufficiently strong, the solutions containing soap being the most effective. The spray is breathed into the spiracles of the insects and reaches the nerve tissue where it slowly affects the nerve cells, causing a state of coma. The general conclusion is that quassia extracts can never become general insecticides owing to the poor insecticidal properties of quassiin. The formula which yielded the



most effective extract was 22 lb. of quassia chips soaked in 100 galls. of fish-oil soap solution for 24 hours. This extract was effective on two out of six species of aphids. Nicotine sulphate is a more reliable insecticide.

**Rust Preventive.** (*Drog. Zeit.*, through *Nat. Drugg.*, 1917, 47, 266.) Lard, 125 Gm., and camphor, 20 Gm., are melted together, and a small quantity of graphite added. Metallic objects, after careful cleaning, are covered with a film of the mixture and allowed to lie 24 hours. At the end of this time the camphor-lard mixture is wiped off. The metal will remain free from rust for many years when treated in this manner.

**Saratoga Ointment.** (*Drugg. Circ.*, 1917, 61, 45.) (1) Powdered boric acid, 30 grains; zinc oxide, 60 grains; oil of eucalyptus, 15 drops; petrolatum, enough to make 480 grains. (2) Powdered boric acid, 5 drachms; zinc oxide, 10 drachms; white petrolatum, 48 oz.; white wax, 1 oz.; spermaceti, 1 oz.; eucalyptol, 2 oz. Melt the wax, spermaceti and petrolatum together, and as it cools sift in the zinc oxide and boric acid, using a No. 90 sieve. Finally, add the eucalyptol as the mass becomes cooler, and stir until it sets. (3) White petrolatum, 160; paraffin (120° m.p.), 8; zinc oxide (pure), 20; boric acid, 20; eucalyptol, 1. Melt the petrolatum and the paraffin together, sift in the powders, stir well together and add the eucalyptol. Allow to congeal, and mill carefully. The proportion of paraffin should be increased in warm weather.

**Selected Formulae.** (*Amer. J. Pharm.*, 1918, 90, 286.) *Foot Liquid*.—Liquid formalehydi, ʒixss.; sp. rosmarini, ʒss. A teaspoonful to a basin of water. Very good for hardening the feet and healing blisters. Much appreciated in Army circles.

*Lotion for Perspiring Hands*.—Lotion of carbolic acid, 1 : 40, ʒv.; formalin, ʒss.; acetic acid, ʒj.; ess. Parma violet, ʒj.; distilled water, to make 6 fl. oz. To be well rubbed on the palms and between the fingers several times a day.

*Dry Shampoo Powder for Hair*.—Powdered orris, 2 drachms; rice flour, 1½ oz.; coumarin, 2 grains. To be sprinkled among the hair and brushed off at the end of the hairs.

*Bath Liquid*.—Solution of ammonia, 1 oz.; liquid extract of quillaia, 1½ oz.; synthetic bergamot, 30 minims; synthetic musk, 3 grains; water, to make 4 fl. oz. The above quantity to a bathful of water. The perfume may be varied.

*Bath or Toilet Ammonia*.—Saponis communis, gr. viij. ; liq. ammon. fort., ʒvj. ; sp. lavand., ʒij. ; aq. dest. ad ʒxx. About a wineglassful to a bath ; about a dessertspoonful to a toilet-basin. Renders washing pleasant when the water is hard ; with soft water it is stimulating. The scent can be varied or increased.

*Sunburn Lotion*.—Blanched almonds, ʒj. ; borax, gr. xx. ; simple tincture of benzoin, ℥L ; orange-flower water, ʒiiss. ; solution of hydrogen peroxide, ʒss. Bruise the almonds and triturate with successive portions of the orange-flower water in which the borax has previously been dissolved ; strain through muslin, and add the tincture of benzoin and the solution of hydrogen peroxide.

*Sunburn Cream*.—Adipis lanæ hydros., ʒj. ; paraffin. liq., ʒij. ; liq. hydrog. perox., ʒiij. ; synthetic otto, gtt. v. Mix the lanoline and liquid paraffin together in a warm mortar, incorporate the solution of hydrogen peroxide, and finally add the otto.

*Quinine Hair Tonic*.—Quin. hydrochlor., ʒj. ; cudbear, gr. xx. ; aq. chlorof., ʒxx. ; aq. rosæ, ʒxl. ; glycerin, ʒj. Macerate for 4 days, shaking twice daily, and filter. To be sprinkled on the scalp and rubbed in every morning.

*Shampoo Powder*.—Pulv. saponis, ʒv. ; conc. soda crystals, ʒij. ; pulv. boracis, ʒij. ; synthetic otto, ʒss. ; synthetic musk, gr. v. About a third of an oz. is sufficient to put up for one shampoo. Should for use be dissolved in a pint or so of warm water, and this solution used to soak the hair and get up a froth.

*Casein Nerve Food*.—Sodium glycerophosph., gr. ij. ; casein, ʒiss., gr. viij. Powder the sodium glycerophosphate and mix lightly with the casein. Dose : One or two teaspoonfuls at meal times.

*Lip Salve*.—White beeswax, 2 oz. ; spermaceti, 1 oz. ; sesame oil, 4 oz. ; honey, 2 oz. ; oil of bergamot, 120 minims. Melt the wax and spermaceti, add the honey, and heat together ; then gradually pour in the oils, and stir until cold. May be coloured with alkanet or vermilion.

*Oxygen Skin Lotion*.—Zinc oxide, 120 grains ; powdered tragacanth, 30 grains ; glycerin or honey, 1 oz. ; ess. white rose, 120 minims ; solution of  $H_2O_2$ , 2 oz. ; distilled water to 12 oz. Stir the tragacanth into the essence, add quickly 4 oz. of the water, and then the remainder. Triturate well the zinc oxide with the glycerin, incorporate gradually the tragacanth mucil-

age, and finally the solution of  $\text{H}_2\text{O}_2$ . This is smeared over the neck and shoulders at night and allowed to remain on over night. Used for several consecutive nights it improves the appearance of the skin.

**Solubility, Note on.** D. B. Dott. (*Pharm. J.*, 1917, [4], 45, 282.) Attention has been previously directed to the fact that the amorphous condition is an important source of discrepant statements as to solubility of alkaloidal salts, and doubtless of other organic compounds. In discussing the existence of acid morphine meconate, it was pointed out (*Y.B.*, 1880, 19) that the salt of that composition is an amorphous substance, the solution of which soon deposits crystals of the normal meconate. The apparent high solubility compared with that of the crystallized neutral salt did not necessarily prove the existence of an acid salt, but might simply be due to the amorphous condition of the salt. The following additional observations on the subject may be of some little interest. When morphine sulphate is evaporated with  $\text{H}_2\text{SO}_4$  sufficient to form the acid salt, a dry amorphous residue is obtained, which is not deliquescent. The fact that the amorphous substance may be powdered and exposed to moist air without deliquescing is probably sufficient to prove that combination has taken place. If, for instance,  $\text{CaSO}_4$  is similarly evaporated with an additional equivalent of acid, the mixture does not become dry and powdery, and when exposed to air, attracts moisture just as free  $\text{H}_2\text{SO}_4$  does. Additional evidence that the acid morphine sulphate is really formed exists in the fact that when washed with anhydrous  $\text{Et}_2\text{O}$  the  $\text{Et}_2\text{O}$  does not redden litmus. When this amorphous acid salt is shaken with water, it rapidly dissolves to the extent of nearly 1 in 1, and then begins gradually to deposit crystals of the neutral sulphate until the amount in solution is about 1 in 24, practically the recognized solubility of ordinary sulphate. When the crystalline neutral sulphate is absolutely dried at  $120^\circ\text{C}$ . and shaken with water, the solubility indicated is simply that of the hydrated salt. But when the neutral salt is taken at the moment of its formation, it is evidently in the amorphous state, and indicates a much higher degree of solubility than normally. This may be shown by adding to a weighed portion of morphine the equivalent quantity of normal acid, when a far stronger solution will at once be obtained than could be formed from the crystalline salt. Those high solubilities

indicated by compounds in the amorphous state are to be regarded only as quasi-solubilities, the only true solubilities having reference to the crystalline compounds. A sample of pure white emetine hydrochloride dissolved in nine parts of water, but the solution soon became cloudy from the formation of crystals. It required 3 parts more of water to render the salt completely soluble. One cannot state the solubility until there has been ample time for the salt fully to crystallize. In assaying opium by the B.P. method, some of the morphine hydrate crystallizes on the side of the bottle as if it separated from the  $\text{Et}_2\text{O}$ , in which it is normally nearly insoluble. That a considerable proportion is at first taken up by the  $\text{Et}_2\text{O}$  can easily be shown by decanting the  $\text{Et}_2\text{O}$  promptly after the first agitation. It may contain one-tenth of the total morphine present. This is another example of the nascent and amorphous condition giving an apparently abnormal solubility.

**Nasal Ointment, Soothing.** (*Amer. Drugg.*, 1918, **66**, 16.) Yellow  $\text{HgO}$ , 4 grains; menthol, 5 grains; phenol, 5 grains; cold cream, 2 oz. Mix thoroughly. Insert a small portion in nostrils and draw it upwards into the nasal passages.

**Nits of Clothes Louse, Destruction of, by solutions of Cresol Soap Emulsion and Lysol.** A. W. Bacot and L. Lloyd. (*B.M.J.*, 1918, **1**, 470.) As the result of a number of experiments, which are detailed and tabulated, it is established that steeping for 20 minutes in a 1 : 50 solution of either "lysol" (crude carbolic acid and soft soap, equal parts) or cresol soap is quite effective in killing the ova or "nits" of lice, provided that the temperature of the solution is not below  $50^\circ\text{F}$ . ( $10^\circ\text{C}$ ). (See also *Y.B.*, 1915, 358; 1917, 313.)

**Paper, Rapid Method for Determining the Relative Porosity of.** S. Mendelsohn. (*Chemist analyst.*, 1917, [23], 6.) A Graham dialyser is arranged by substituting paper (the sample subject to examination) for the membrane. Into the upper vessel introduce a definite quantity of  $\text{N}/10$   $\text{NaCl}$ , into the lower receptacle a measured volume of distilled water. Proceeding the lapse of 1 hour, remove the lower vessel and agitate contents. Pipette an aliquot portion into a porcelain evaporating dish and titrate with  $\text{N}/20$   $\text{AgNO}_3$ , using a solution of neutral  $\text{K}_2\text{CrO}_4$  as the indicator. Multiply the quantity of  $\text{NaCl}$  found by the total volume of  $\text{H}_2\text{O}$  that was originally in the vessel. The



result when compared to the findings of other tests with paper under similar conditions represents the relative porosity. Presume that in the test of a standard paper, the amount of NaCl that passed through in 1 hour is  $x$  grams. A sample, subject to the same routine allowed  $y$  grams to pass during the specified period. The relative porosity may be ascertained by the formula  $y/x$ .

**Para-dichlorbenzene as an Insectifuge.** W. A. K o n a n t z. (*J. Amer. Pharm. Assoc.*, 1918, 7, 341.) The attention of pharmacists is directed to paradichlorbenzene as being the most effective means of destroying clothes moths in textile fabrics and furs, and therefore as a suitable substance for the preparation of moth balls, moth papers, and insecticide solutions. It occurs in colourless transparent flakes somewhat resembling naphthalin in appearance, but with a slight, pleasant, camphoraceous odour, which quickly disappears from garments when they are exposed to the air after being in contact with the preparation. The efficacy of para-dichlorbenzene as a moth poison suggests that it may also be used to drive away other insect pests. Dissolved in  $C_6H_6$  or  $CCl_4$  or other suitable solvent it may be applied as a spray. Attention is also directed to its possible value as a remedy for parasitic skin diseases. It is readily soluble in soft paraffin and in oils and fats. (See also *Y.B.*, 1916, 409.)

**Potato Cooking, Food Wastage in.** J. R. H i l l. (*Pharm. J.*, 1918, [4], 46, 149.) Water in which potatoes have been boiled, which is usually thrown away, contains about 70 per cent. of the saline constituents of the potato, chiefly citrate of potassium, with some citrates of sodium and calcium, and a little free citric acid, which give it those anti-scorbutic properties making potatoes so specially useful in the treatment of scurvy. The liquid also contains about 70 per cent. of the common salt added for flavouring to the water in which the potatoes are boiled. The loss doubtless varies, but an experiment made to determine the loss in the ordinary method of boiling peeled potatoes in water, which is thrown away, gave the following results: The liquid was filtered, and the residue on the filter dried and weighed. The weight was equal to about 3.5 per cent. of the dried potato. The filtrate was evaporated to dryness, and the residue weighed. The quantity of NaCl having been determined was deducted, and the weight of residue found to be equal to about 6.5 per

cent. of the dried potato. The liquid poured off in boiling potatoes in the ordinary way, therefore, contained about 10 per cent. of the solid matter of the potato. It is important to note that potatoes have a dietetic value, first as a carbohydrate, and secondly as an anti-scorbutic. In the foregoing experiment cooking by boiling as described involves a loss of about 70 per cent. of the anti-scorbutic constituents. The remainder of the 10 per cent. loss consists chiefly of starch, with a little sugar, and some detached cellulose. It will thus be seen that this 10 per cent. loss consists almost entirely of the two constituents which give the potato its dietetic value. The significance of this wastage may be better appreciated by bearing in mind that for every ton of potatoes cooked about 60 lb. of the more valuable feeding and health-preserving constituents (equal to more than two hundredweights of fresh potatoes) are thrown away, as well as about 66 lb. of common salt. There is the same wastage in preparing potato flour for bread making now so largely adopted. There are two simple ways in which this waste can be entirely avoided. The liquid poured off makes an excellent basis for soups. It may also be successfully used instead of milk in baking scones. It possesses just the proper saltiness for such purposes. In America the liquid poured off in boiling potatoes is largely used in outlying districts to disintegrate dried yeast cakes, and start the fermentation process in bread making. In cooking many other vegetables there is an analogous wastage of valuable foodstuff which merits attention.

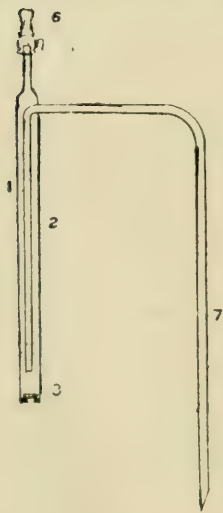
**Soxhlet Extractor, A Modified.** D. F. TWISS and W. McCOWAN. (*J. Soc. Chem. Ind.*, 1917, 36, 692.) The following slight modification of Blount's form of Soxhlet's extraction apparatus possesses many obvious advantages over the original Soxhlet with its fragile external tube. In Blount's apparatus there are two or more apertures of indefinite size by which the vapour passes into the inner compartment. In the modification now described only one aperture, A, is recommended, of approximately 0.7 cm. diameter; this restriction causes a very slight excess of pressure and temperature in the outer jacket, sufficient, however, to maintain



the liquid in the extractor cup in gentle ebullition. Another advantage is that whereas in Blount's extractor the double jacket extends to the top, in the form now represented the double jacket is shorter and the neck formed by an additional glass collar.

**Spices, Use of Micro-organisms to Determine the Preservative Value of.** Freda M. Bachmann. (*J. Ind. Eng. Chem.*, 1918, 10, 121.) Moulds, yeasts and bacteria show a marked variation in sensitiveness to different brands of spices. The amount of growth of such organisms in a given time on media containing spice may be used as a means of determining the relative preservative values of the different brands of the spice. The organisms used were *Bacillus subtilis*, *B. coli*, *B. prodigiosus*, and *Sarcina lutea*. Five yeasts were used, one of which was isolated from the commercial yeast foam, another from compressed yeast. The other three were old laboratory cultures of *Saccharomyces cerevisiae*, *S. ellipsoideus*, and *S. anomalus*. The moulds were *Aspergillus niger*, *Penicillium glaucum*, *Rhizopus nigricans*, and an *Alternaria* which is probably *Alternaria tenuis*. The medium employed was sterile, nutrient agar containing a definite amount of spice. The bacteria and yeasts were grown

in test-tubes, the bacteria on beef broth agar and the yeasts on wort agar. For the moulds a shallow watch-glass of 1½ inch diameter was placed inside a Petri dish and then both were sterilized in the oven. The spices tested were all commercial powders of cloves and allspice. These showed very marked differences in power in inhibiting the growth of colonies of the various organisms. (See also *Y. B.*, 1912, 368.)



mouthpiece, 6, with the tap open, the liquid is forced up the tube, 1, and starts the siphon, the valve, 3, closing by the

**Siphons for Corrosive and Other Liquids.** P. J. Channon. (*Journ. Soc. Chem. Ind.*, 1918, 36, 81A.) The leg, 2, of the siphon is inserted into the reservoir of liquid, whereby the liquid raises the valve, 3, and partly fills the space between the tubes, 1 and 2. By blowing through the

pressure. The tap, 6, is then closed and the siphon continues to act. The apparatus is the subject of a patent.

**Syrup for Soda Fountain, War Emergency Formula for.** F. A. U p s h e r S m i t h. (*J. Amer. Pharm. Assoc.*, 1918, 7, 354.) Granulated sugar,  $4\frac{1}{4}$  lb. ; liquid glucose,  $2\frac{3}{4}$  lb. ; distilled water, sufficient to make 1 gallon. Mix in pan, raise to the boiling point, stir until properly mixed, then strain into a bottle ; when cold, cork and keep in a cool place. The sp.g. of this syrup is 1.291. It is, therefore, lighter than U.S.P. syrup and is less sweet. But soda fountain syrups have always been made extremely sweet, if not too sweet, and it is possible, after a time, that a less sweet syrup will be more in favour through the gradual weaning of the people from their previous use of an excess of sugar.

**Supposed Origin of Life in Solutions of Colloidal Silica.** S. G. P a i n e. (*Ann. Bot.*, 1916, 30, 383, through *Chem. Abstr. Amer. Chem. Soc.*, 1918, 12, 705.) The experiments of Bastian have been repeated. A total of 85 tubes of colloidal silica were examined. Forms, which in a slight degree resembled organisms, were found in the amorphous deposit which collected in the tubes ; these were shown to be compounds of silica. These bodies are thought to be identical with some of the so-called "fungus germs" described by Bastian. It is concluded that the forms resembling organisms, described by Bastian as evidence of spontaneous generation of life, were in part purely inorganic simulacra formed by slow deposition of silica from colloidal solution and in part depositions of silica upon dead fungal hyphæ which had developed in the solutions before these were filled into the tubes and sterilized.

**Tooth Paste.** H. W. S h e r m a n. (*Nat. Drugg.*, 1917, 47, 264.) After experimenting with a number of recently published American formulæ for tooth pastes, none of which were found to give satisfactory results, the following recipe was devised : Boric acid, 0.6 Gm. ; prepared chalk, 5.5 Gm. ; powdered soap, 12.0 Gm. ; thymol, 0.1 Gm. ; saccharin, 0.15 Gm. ; oil eucalyptus, 0.5 c.c. ; oil spearmint, 0.5 c.c. ; alcohol, 0.5 c.c. ; glycerin, 7.0 c.c. ; agar-agar solution, 17.0 c.c. Finely powdered boric acid is dissolved in glycerin with the aid of gentle heat. Volatile oils, thymol and saccharin are dissolved in the alcohol and this solution thoroughly mixed with the chalk ; the



glycerin solution and soap are now incorporated. Dissolve 0.2 Gm. agar-agar in 30 c.c. boiling water and evaporate down to 18 c.c. Strain the hot agar solution directly into the mixture previously made and beat thoroughly till cool. Let stand for 2 hours and then pack in collapsible tubes immediately.

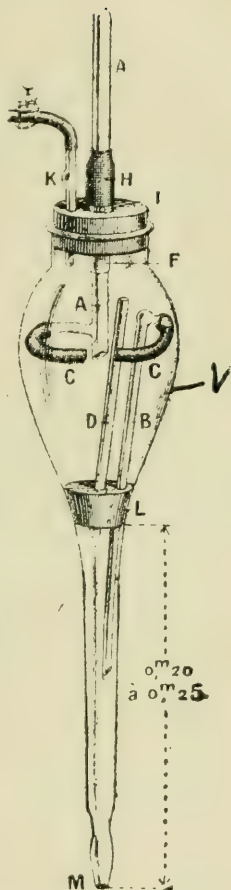
**Tooth Powder, Antiseptic.** N. C. Fischer. (*B.M.J.*, 1918, [1], 287.) Mag. carb. pond., 3; sulph. sub., 1; pulv. sapo. bast., 1; ol. menth. pip., q.s. To be used with a stiff toothbrush after meals. This powder is excellent to prevent oral sepsis and counteract a tendency to pyorrhoea.

**"Trikesol" Substitute from Commercial Cresol.** Mary Nevin and B. Mann. (*J. Amer. Chem. Soc.*, 1917, 39, 2752.) Purified and redistilled cresol can be used as a preservative for biological products. The fraction from 199-204° C., with a sp.g. of 1.030 at 25° C. is the best for this purpose. It has the same toxicity as phenol, only slightly lower than "Trikesol," but a germicidal coefficient of 2.55, which is higher than that of "Trikesol."

**Wax Thermometer for Hot-Air Sterilizing Chamber.** E. Emrys-Roberts. (*B.M.J.*, 1918, 2, 509.) Two glass bulbs, such as large vaccine ampoules, are filled with wax. The wax in one has the m.p. at the minimum temperature desired, that in the other is selected to melt at the maximum temperature. In each bulb a few black beads are placed. These wax-filled and sealed bulbs are fitted in a metal frame in two sets of spring clips. The beads are placed uppermost. When the wax melts these beads sink to the bottom. For destroying lice in clothing, the temperature of 60° C. for 10 minutes is effective. For registering this temperature, therefore, a wax with that m.p. may be used to fill the minimum bulb. For the maximum bulb, wax of m.p. 80° C. should be employed. After use, the bulbs are taken out of the clips when the wax has recongealed and reversed, so that the beads are again uppermost. The instrument is then again ready for use. This device is an adaptation of the suggestion of A. Bacot of placing dishes containing wax in the hot air chambers used for sterilizing clothing.

**Wound Irrigation, Automatic Siphon Reservoir for Discontinuous Flow of Liquid.** — Primot. (*J. Pharm. Chim.*, 1917, 16, 325.) The figure represents a siphon which will automatically deliver, at desired intervals, from 50 to 200 c.c. of

liquid. It has been devised to facilitate the irrigation of wounds by the Carrel-Dakin method. *V* is a pear-shaped reservoir of a capacity of 250 c.c. *A*, *B* and *C* are the three parts of the siphon fitted on with rubber tubing. Part *A* is closed at the upper end, and is movable through a glass tube of slightly wider diameter, forming a collar, *F*, through which it slides, and fitted with an external rubber collar, *H*, which holds it at any desired height. The tube, *D*, and the hole, *I*, in the tube, *F*, keep the interior pressure of the apparatus in equilibrium with that of the external atmosphere. *K* is a drop-counter connected by a rubber tube to the reservoir containing the antiseptic solution. To this a pinchcock is attached, so that the rate of inflow can be adjusted. This part of the apparatus should be about 3 inches above the cork. All the corks should be paraffined: the large one on its inner lower surface, the smaller lower one on both inner and outer surfaces. The parts from *L* to *M* should be at least 8 inches in length. The volume of each charge of liquid is regulated by raising or lowering the tube *A*. This may be adjusted by measuring into a graduated cylinder the quantity delivered in a given time. The time between each discharge is regulated by the rate of flow into the reservoir through the drop counter *K*.



## RESEARCH LIST, 1918-19

THE following subjects are suggested for investigation. The Executive Committee hopes that Members of the Conference will undertake to work on one or more of these. It should be noted that some of the subjects may have been appropriated already. In order to avoid duplication the Honorary General Secretaries trust that members will communicate to them their intention of working at any of the subjects mentioned; they also wish to direct attention to the fact that a special fund exists to defray expenses connected with research work. The Executive Committee will be glad to receive applications from members for grants from this fund.

*Acetylsalicylates*.—Which is the most suitable salt for pharmaceutical purposes? Do the salts possess any advantages over acetylsalicylic acid? (see *Y.B.*, 1908, 237; 1909, 109; 1911, 215; 1912, 227, 230; 1917, 117).

*Apiol*.—A standard formula for its preparation is required (see *Gen. Index* and *Y.B.*, 1905, 23; 1907, 187; 1909, 100; 1910, 142; 1913, 285; 1914, 125).

*Atropine Sulphate*.—Is the commercial article variable in character? (see *Gen. Index* and *Y.B.*, 1910, 5; 1912, 18; 1914, 256).

*Belladonna Root*.—In what respects, if any, does a tincture from the fresh root differ in its composition and action from one from the dried root?

*Belladonna Root (Indian)*.—Parcels of this drug have given abnormal figures on analysis, indicating the presence of some base of a lower molecular weight than atropine. An investigation of this drug is required (see *Y.B.*, 1913, 267; 1915, 217; 1917, 195).

*Bismuth Phenate*.—An examination of commercial samples would be of interest (see *Gen. Index*).

*Calx Sulphurata*.—An examination of the processes of manufacture and the purity of commercial samples is needed.

*Cannabis Indica*.—The physical characters and therapeutic value of the official preparations are stated to be liable to considerable variation. An investigation is required to determine whether any chemical standard is possible, and if not, whether physiological tests should be introduced. A report on the com-

parative values of the official Indian drug and those varieties produced in Goa, Africa, America, and Greece is desirable (see *Gen. Index* and *Y.B.*, 1908, 40, 229; 1909, 43, 110, 240; 1910, 143; 1911, 163; 1912, 247, 266; 1913, 263, 264; 1915, 227; 1917, 218, 271).

*Casein Foods*.—A comparative examination of the so-called "Foods" or "Nerve Tonics" of the type represented by the combination of soluble casein and glycerophosphates, etc., would be useful (see *Gen. Index* and *Y.B.*, 1915, 241).

*Casein (Soluble)*.—Details of improved processes for the preparation of soluble casein are required.

*Colouring Agents*.—An investigation with a view to determining the most suitable colouring agents for syrups, such as *Syrup. Glycerophosph. Co.*, and other galenicals is needed.

*Deterioration*.—Some drugs, chemicals and preparations are subject to deterioration upon storage. An investigation should be undertaken with the view to recording the extent to which such articles can be kept in a pharmacy in normal conditions and for a reasonable length of time and yet comply with the B.P. requirements (e.g., magnesia, ammonium carbonate).

*Dichlorethylene*.—The examination of commercial specimens of dichlorethylene, with special reference to their suitability for making iodine solutions for the sterilization of the skin prior to operations, is needed.

*Drugs*.—The following drugs require further systematic chemical investigation: *Adonis vernalis* and *Adonis vernalis* (see *Gen. Index* and *Y.B.*, 1913, 132, 295; 1916, 3; 1918, 227), *Cereus (Cactus) grandiflorus* (see *Gen. Index* and *Y.B.*, 1910, 209; 1911, 240; 1916, 287), *Cassia fistula*, *Serenoa serrulata* (see *Gen. Index* and *Y.B.*, 1917, 160, 344), *Arnica montana* (see *Gen. Index* and *Y.B.*, 1904, 27), *Monsonia ovata*, *Monsonia biflora* (see *Gen. Index*), *Thuja occidentalis* (see *Gen. Index* and *Y.B.*, 1911, 117; 1914, 267), *Tanacetum vulgare* (see *Gen. Index* and *Y.B.*, 1910, 173), *Senecio Jacobea* (see *Gen. Index* and *Y.B.*, 1912, 279; 1916, 226), *Achillea millefolium* (see *Gen. Index* and *Y.B.*, 1908, 5), *Aletris farinosa* (see *Gen. Index* and *Y.B.*, 1911, 220; 1915, 225), *Rhamnus purshianus* (see *Gen. Index* and *Y.B.*, 1916, 204, 270; 1917, 206, 208, 212), *Polygala Senega* (see *Gen. Index* and *Y.B.*, 1906, 217; 1909, 123; 1916, 381).

*Ergot*.—A re-investigation of the pharmacy of this drug in the light of recent chemical work is required, and a method of deter-



mining the activity of the galenical preparations (see *Gen. Index* and *Y.B.*, 1914, 8; 1915, 234).

*Ferments*.—The action of ferments in inducing changes in galenical preparations might be studied.

*Formulæ*.—Improved formulæ are required for the administration of nauseous drugs.

*Galenicals*.—Investigation is required of the changes in the strength of galenicals, etc., during preparation and on keeping, which may render the original formula an unfair criterion of the finished product, e.g., loss of ammonia in filtering Tinct. Quininae Ammoniata; loss of formaldehyde from the tablets; loss of iodine in making Syrup. Ferri Iodidi.

*Galenicals*.—The B.P. 1914 has introduced in a few cases tests for galenical preparations (e.g. *Acetum Scillae*). An investigation is needed with a view to ascertaining how far the specific gravity and other physical constants may be considered to be a fair criterion that a galenical has been made in accordance with the B.P. directions.

*Gum-Resins*.—The value of the saponification numbers in determining the identity and purity of the resin of gum-resins.

*Hydrargyrum c̄ Creta*.—The conditions (if any) under which the volatilization of mercury from wrapped powders of *Hydrarg. c̄ Creta* is liable to take place.

*Liquor Hamamelidis*.—What is the nature of the aldehydic constituent in this preparation? (see *Y.B.*, 1911, 195).

*Mercury Zinc Cyanide*.—Does any change in chemical composition occur when dressings containing this substance are sterilized by heat? (see *Y.B.*, 1907, 269; 1908, 117).

*Morphine*.—Can the process described in *Y.B.*, 1907, 107, for the determination of morphine be applied to opium and its preparations?

*Oil of Soya Bean*.—Can this be utilized more widely in pharmacy? (see *Y.B.* 1910, 104; 1912, 120).

*Opium, Extract of*.—To what is the loss of morphine due in making this extract? Is it constant with different lots of opium? (see *Y.B.*, 1910, 28; 1913, 359, 360; 1914, 17; 1917, 11).

*Pareira (Bahia)*.—Examination of the alkaloidal constituents is required (see *Gen. Index* and *Y.B.*, 1907, 120; 1912, 32; 1913, 27; 1916, 367).

*Phenol, Liquefied*.—The pharmacy of this substance requires further investigation (see *Gen. Index* and *Y.B.*, 1910, 233; 1917, 263).

*Pills*.—A systematic examination is required to determine the time necessary for the solution or disintegration of pills prepared with different excipients and kept for various periods.

*Quillaia Bark*.—Experiments are desirable to determine the best solvent for exhausting this bark for the purpose of making emulsifying agents, and a comparison of the official bark with the thin bark met with in commerce (see *Gen. Index* and *Y.B.* 1907, 107; 1910, 209; 1916, 369).

*Santonin*.—Analyses are required showing the percentage of santonin in Colonial and Indian species of *Artemisia* allied to *Artemisia maritima* (see *Gen. Index* and *Y.B.*, 1913, 293, 294; 1914, 138, 139).

*Saponins*.—A simple and accurate method of determining saponins in drugs is required (see *Gen. Index* and *Y.B.*, 1904, 78, 87; 1906, 71; 1909, 5, 71, 80; 1910, 115; 1911, 117, 124, 126; 1912, 131; 1913, 142, 145, 146, 147; 1914, 99; 1915, 115; 1916, 152; 1917, 90, 91).

*Solvents*.—Experiments are needed with a view to extending the use of solvents such as acetone, carbon tetrachloride, dichloroethlene, petroleum ether, amyl acetate, etc., in pharmacy.

*Strophanthus*.—An examination of the published methods of separating the different active principles obtained from the official seeds is needed with a view to recommending a standard process. The seeds in commerce are frequently mixed. Further information is required as to the active principles they severally contain (see *Gen. Index* and *Y.B.*, 1904, 244; 1905, 202, 370; 1906, 74, 110, 249; 1910, 220; 1911, 125; 1912, 131, 280, 337; 1913, 134, 147; 1915, 107; 1917, 284).

*Tannin*.—A ready and tolerably accurate method for the determination of the tannin in various astringent drugs is required (see *Gen. Index* and *Y.B.*, 1906, 86; 1907, 158; 1912, 312, 314; 1913, 122, 187, 214; 1916, 208).

*Taraxacum Root*.—The investigation of fresh drugs such as this by Bourquelot's method for the detection and isolation of easily hydrolyzed glucosides is required (see *Y.B.*, 1907, 58; 1914, 319).

*Tinctures*.—Experiments are needed to determine the best method for the prevention of the occasional gelatinization of tinctures, with special reference to *Tinct. Card. Co.* P.B. 1914.

*Valerian Root*.—Chemical investigation of the fresh root by Bourquelot's method is required (see *Y.B.*, 1907, 58; 1914, 319).

THE TRANSACTIONS  
OF THE  
**British Pharmaceutical Conference**  
AT THE  
***FIFTY-FIFTH ANNUAL MEETING***  
HELD IN  
**The Lecture Theatre, 17, Bloomsbury Square, London,**  
**WEDNESDAY, JULY 10, 1918.**

**Order of Business.**

Address of Welcome by the President of the Pharmaceutical Society.

Reception of Delegates.

Presidential Address by CHAS. ALEX. HILL, B.Sc., F.I.C.

The Executive Committee's Report.

The Honorary Treasurer's Report.

Election of Officers for 1918-19.

# British Pharmaceutical Conference.

FIFTY-FIFTH ANNUAL MEETING, IN LONDON, July 10, 1918.

## LIST OF OFFICERS.

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CHAS. ALEX. HILL, B.Sc., F.I.C., London.

### Vice-Presidents.

*(Who have filled the office of President.)*

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C. SYMES, Ph.D., Liverpool.

E. M. HOLMES, F.L.S., London.

G. CLARIDGE DRUCE, M.A., J.P., Oxford.

T. H. W. IDRIS, F.C.S., London.

W. A. H. NAYLOR, F.I.C., London.

ROBERT WRIGHT, F.C.S., Buxton.

J. F. TOCHER, D.Sc., F.I.C., Aberdeen.

FRANCIS RANSOM, F.C.S., Hitchin.

W. F. WELLS, Dublin.

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MAJOR E. SAVILLE PECK, M.A., Cambridge.

DAVID HOOPER, LL.D., F.I.C., Dornock.

### Vice-Presidents.

*(By election.)*

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H. G. GREENISH, F.I.C., F.L.S., London:

LIEUT.-COL. E. F. HARRISON, C.M.G.,  
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JAMES TATE, Belfast.

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G. WHITFIELD, Scarborough.

### Honorary Treasurer.

D. LLOYD HOWARD, F.C.S., London.

### Honorary General Secretaries.

CAPT. H. FINNEMORE, B.Sc., F.I.C., London. | R. R. BENNETT, B.Sc., F.I.C., London.

### Other Members of the Executive Committee.

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H. DEANE, B.Sc. F.I.C., Long Melford.

F. W. GAMBLE, London.

C. H. HAMPSHIRE, B.Sc., F.I.C., London.

A. R. MELHUISH, London.

H. SKINNER, London.

H. L. SMITH, B.Sc. F.I.C., London.

THOS. STEPHENSON, F.R.S.E., Edinburgh.

HAROLD WYATT, Liverpool.

### Honorary Auditors.

W. F. GULLIVER, London, and W. L. HOWIE, London.



## THE CONFERENCE SESSION

HELD IN

**The Lecture Theatre, 17, Bloomsbury Square, London**

*Wednesday, July 10, 1918*

The Conference opened at 11.30 a.m. Mr. C. A. Hill, President, occupied the chair, and was supported by Mr. W. L. Currie (President of the Pharmaceutical Society), Mr. D. Lloyd Howard (Hon. Treasurer), and Mr. R. R. Bennett (Hon. Secretary). The following members were also among those present: Professor H. G. Greenish, Messrs. C. T. Allen, A. Proctor Atkinson, J. O. Braithwaite, E. T. Brewis, W. Browne, A. F. Cholerton, F. W. Crossley-Holland, H. Deane, Alan Francis, J. B. Francis, H. Wippell Gadd, J. P. Gilmour, W. S. Glyn-Jones, A. Gunn, C. H. Hampshire, T. L. Hewitt, W. L. Howie, T. H. W. Idris, A. H. Jenkin, H. H. Jones, A. R. Keith, W. Kirkby, G. J. Knight, T. E. Lescher, I. T. Lloyd, T. Maben, A. Macdonald, A. E. Marsh, J. H. Mather, A. R. Melhuish, E. J. Milard, J. Milner, W. A. H. Naylor, C. A. Noble, A. E. Parkes, A. J. Pidd, F. Ransom, P. F. Rowsell, W. H. Saunders, P. A. W. Self, H. Skinner, A. H. Soloman, F. Southernden, J. O. Thomas, G. A. Tocher, W. P. Want, H. S. Watson, W. J. U. Woolcock, A. Wright, H. C. Wright.

### WELCOME BY THE PRESIDENT OF THE PHARMACEUTICAL SOCIETY

Mr. W. L. CURRIE (President of the Pharmaceutical Society) said that he regarded it as a privilege and a pleasure to welcome members of the Conference and delegates to the Society's premises. It was a matter of regret to all concerned that the proceedings of the Conference had to be limited and contracted at present. It was the earnest hope of all interested in the Conference that before another year came round the war would be over, so that they would be free to resume the normal round of provincial visits. On behalf of, and in the name of the Council of the Society he welcomed the members of the Conference,

and hoped they would have a pleasant and profitable meeting.

Mr. C. A. HILL acknowledged the hospitality extended to members of the Conference by the President of the Pharmaceutical Society, and he expressed the hope that the cordial relations existing between the Pharmaceutical Society and the Conference would long continue.

#### APOLOGIES FOR ABSENCE

Mr. R. R. BENNETT intimated that apologies for absence had been received from : Sir Thomas Barclay, Mr. W. P. Evans, Capt. H. Finnemore, Messrs. F. W. Gamble, W. Giles, Dr. D. Hooper, Messrs. J. Rutherford Hill, A. N. Kennard, A. McMillan, J. Michie, J. R. Reith and W. F. Wells.

#### DELEGATES

Mr. R. R. BENNETT read the names of the following delegates appointed to attend the meeting :—

*Pharmaceutical Society of Great Britain.*—The President (Mr. W. L. Currie), The Vice-President (Mr. E. T. Neathercoat), Miss M. E. Buchanan, Messrs. J. H. Cuff, J. W. Deakin, R. L. Gifford, J. F. Harrington, F. G. Hines, A. H. Jenkin, J. Keall, P. F. Rowsell, F. P. Sargeant, H. Skinner, H. Wolff.

*Pharmaceutical Society of Great Britain (North British Branch).*—The Chairman (Mr. W. Giles), The Vice-Chairman (Mr. A. McMillan), Messrs. W. B. Cowie, J. H. Fisher, J. J. Forbes.

*Aberdeenshire (West) Pharmacists' Association.*—Mr. J. R. Reith.

*Association of Women Pharmacists.*—Miss M. E. Buchanan.

*County of Essex Association of Pharmacists.*—Messrs. C. Goode, J. H. Matthews, C. Rundle.

*County of Surrey Association of Pharmacists.*—Messrs. W. Bowden, W. H. Fowler.

*Devon Pharmaceutical Association.*—Messrs. H. Wippell Gadd, P. F. Rowsell.

*Dover Chemists' Association.*—Mr. J. Harcombe Cuff.

*Glasgow and West of Scotland Chemists' Association.*—Messrs. W. L. Currie, A. McMillan.

*Leeds Chemists' Association.*—Mr. F. Pilkington Sargeant.

*Liverpool Chemists' Association.*—Messrs. W. H. Clubb, H. Humphreys Jones.

*Manchester Pharmaceutical Association.*—Messrs. W. Kirkby, J. Grier, A. J. Pidd,

*Middlesex Pharmaceutical Association.*—Messrs. H. E. Clement, J. Humphrey, E. F. Strickland, H. Skinner, H. Wolff.

*London County Pharmaceutical Association.*—Messrs. A. H. Jenkin, A. R. Keith, A. R. Melhuish, C. A. Noble, W. E. D. Shirtliff, H. Skinner, J. A. Thompson, G. A. Tocher, W. B. Trick, A. J. Wing.

*London (South East) Chemists' Association.*—Messrs. C. Hap-  
pold, J. Milner, W. C. Sayers, A. J. Wing.

*Bucks Pharmaceutical Committee.*—Messrs. A. M. Kennard, H. E. Walden.

*London (Western) Pharmacists' Association.*—Messrs. W. Browne, C. H. Hampshire, A. Latreille, A. R. Melhuish, C. A. Noble, H. R. Proctor, W. E. D. Shirtliff, G. A. Tocher, H. F. Trunchion, H. S. Watson, W. Wilkinson.

*Sheffield Pharmaceutical and Chemical Society.*—Mr. E. Preston

THE PRESIDENTIAL ADDRESS  
PHARMACY AFTER FOUR YEARS OF WAR

BY CHAS. ALEX. HILL, B.Sc., F.I.C.

The British Pharmaceutical Conference is an institution which deserves to be perpetuated, although its activities and main functions are more or less suspended during the war. The present duties of the officers and the Executive consist largely in securing continuity for the existence of the Conference, so that peace may find it living though dormant, and ready to resume its leading part in promoting the scientific side of pharmacy. Less even than last year will it be expected of me to attempt a formal Presidential Address on the lines made familiar by my distinguished predecessors. I shall ask your indulgence for a brief space while I review the position in which Pharmacy finds herself after four years of war. Last year, when I had the honour to address you, we considered the national supply of medicines in war time chiefly from the point of view of availability of materials, drugs, and others. That subject is still of immediate interest to us all ; but an examination of the position of pharmacy after four years of war leads us farther ; it leads us to a consideration of drugs which are increasing or diminishing in the extent to which they are used, not by reason of their greater or less availability, but on account of changes in method of treatment, medical and surgical, and whether or not as a direct outcome of the war. On the occasion just referred to, I discussed certain aspects of the problem of maintaining an adequate supply of general medicines in war time, dealing chiefly with the supply of crude drugs and other raw materials and with Government control of materials as affecting pharmacy. While it will not be necessary to-day to deal at all fully with the subject which occupied our attention a year ago, yet the fact has to be recorded that an outstanding feature of the past year has been the widespread extension of this system of Government control of all materials, not only of drugs and chemicals, but of



all sorts of materials necessary for carrying on our business, such as coal, paper, tinplate, glassware, and materials for manufacturing plant.

If the Government assumes control of a material, the Government should secure supplies of that material to essential industries dependent on it. Experience of the past four years shows that sometimes this is the case and sometimes not. When the latter happens it is often left to some private interest, more closely affected than the rest of the trade, to take action and to overcome the inertia of the British Constitution. On the whole, however, we may say that this extension of Government control of materials has been accompanied by a better recognition of the needs of pharmacy—a recognition, that is, of the fact that pharmacy is essential in the national economy, and, incidentally, to the winning of the war. At all events, there are no startling developments since I addressed you a year ago. Most of the essential commodities have been available in sufficient amount, for which satisfactory state of affairs medicine and pharmacy are much indebted to the good offices of the National Health Insurance Commission.

*Crude Drugs.*—The supply of crude drugs from overseas is at present subject to many difficulties, not the least of which is the question of freight. When we consider that the Government control of shipping will not cease with the termination of hostilities (three years is commonly mentioned, and one year may be regarded as inevitable), it will be seen that the supply of these drugs is to a large extent a Government matter. The importance of securing to this country ample supplies of necessary crude vegetable drugs and elementary or raw materials from abroad is not likely to be lost sight of by those immediately interested, and it is to be hoped that it will also occupy the attention of those whose business it is to watch the larger interest of the Nation's welfare.

It cannot be too strongly urged that Government control of materials should involve Government obligation to allot adequate supplies to such an essential industry as the drug trade, and that not only for Army needs but for civilian purposes.

The "Drugs and Chemicals (Returns) Order, 1918," provided what was in effect a national stocktaking of drugs, together with an estimate of the annual consumption. This information was collected in respect of some 112 articles, a number which would have been exceeded but for the fact that the information

in regard to many others omitted from the list was already in the possession of the Government. While the primary object of this Order may be taken to be securing supplies for the Army needs, it cannot be doubted but that the provision of stock of essential drugs for general national requirements also was intended. The number of crude drugs which have become unobtainable owing to the closing of enemy countries is small, since alternative sources of supply have been more or less available. The freight and insurance question has been all along the ruling factor for the shortage of supply. To illustrate this, the following example of quite a recent occurrence may be quoted—a consignment of Mexican scammony root was landed a few weeks ago, the invoice value of which was £1,000 f.o.b. ; the freight and charges on this consignment amounted to £1,800.

From the short particulars which I am about to give in respect of a number of vegetable drugs, it will be seen that in some instances stocks are becoming dangerously low ; in fact, approaching exhaustion. Such stocks are not replaceable without Government assistance. It may be said that drugs proper have not lent themselves to profiteering to anything like the same extent as chemicals, and that there has been less suspicion of the channels through which they have come. *Acacia Gum*.—Parcels from the Sudan have been coming forward fairly well, and prices have not risen to any extent. *Ammoniacum*.—Old stocks have met all requirements so far, but no fresh imports have made their appearance. *Asafetida*.—Almost a famine prevails in this article as with most others from the Persian Gulf. *Calumba Root*.—There is at present a famine in this drug. Consignments which would in pre-war days have been considered dear at 17s. per cwt., have recently been eagerly competed for up to 220s. per cwt. *Cascarilla*.—Supplies have reached this market spasmodically, and prices have not greatly advanced. *Caraway Seeds*.—The Dutch Government prohibits the export, so that our only source of supply, beyond the small amount of English-grown, has been Morocco. *Cascara Sagrada*.—Owing to the bulky nature of this drug the shipping difficulty comes in. Stocks in this country were large, but have steadily diminished during the war, and the price is advancing equally steadily. *Colchicum*.—English collectors now make us independent of imports, both as regards corm and seeds. *Chamomiles*.—English growers do not seem to increase their output, and in the absence of the usual Belgian supplies we have had to fall back on the

French growers, who have increased their ideas of value accordingly. *Cannabis Indica*.—Owing to the action of the Indian Government, Bombay tops are getting very scarce and dear, but fair quantities of really good samples from the Cape and America are forthcoming, which relieve the situation, and answer well for some unofficial purposes. *Colocynth*.—The old Levant or Turkey colocynth is now never met with, but sufficient Egyptian and Spanish comes to hand to meet all requirements. *Cardamoms*.—In the absence of Continental buyers sales are difficult, and prices rule normal. *Cubebs*.—The supply is ample, yet the price has doubled during the war. *Ergot*.—The pre-war stocks are, of course, long since exhausted. With little coming from Russia, we are now dependent upon Spain and Portugal. *Euphorbium*.—At the moment unobtainable. Supplies of this drug, however, have always been spasmodic. *Digitalis*.—As with colchicum, English growers can now meet all our wants. *Galls*.—The variety known as Aleppo galls is almost unobtainable, but fair parcels of China galls have come to hand. *Galbanum*.—This, a Persian Gulf drug, is now unobtainable. *Grains of Paradise*.—The market is bare of this drug. Supplies formerly were irregular, but now they seem to have stopped altogether. *Linseed*.—This is controlled; high prices rule in consequence. *Liquorice Root*.—In pre-war days the common natural root came from Central Asia, being shipped from the Persian Gulf, and the scraped root came from South Russia; both these sources have been cut off. For some time a fair quantity of Sicilian root of various grades reached this country, but now that source of supply also has become cut off. Spanish root is now the only kind procurable, and recent consignments which have reached this country have been of very low quality indeed. Notwithstanding its inferior nature, the present price of liquorice root is some fourteen times as great as the pre-war value. *Opium*.—The different varieties of Turkey and Smyrna opium have been unobtainable since the pre-war stocks became used up. Occasional parcels of Salonica opium have come through. Persian opium, however, has been in plentiful supply, and although this is of lower alkaloidal strength it has met all druggists' requirements. Indian opium of still lower percentage has been available for the manufacture of morphine. The present value of opium is 6s. 3d. a unit, as compared with 2s. a unit before the war. *Poppy Heads*.—The English supply is sufficient for the poppy heads sold wholesale as such, but we miss the former Dutch and Belgian supplies. *Rhubarb*.—Although

acute shortage has frequently been threatened, stocks have been just about sufficient to meet requirements. *Belladonna*.—English growers are now providing nearly enough to meet all our requirements. Indian and Japanese roots have been shipped to this market with a view to replacing the former Austrian supply. *Balsam of Tolu*.—The shipping difficulty is answerable for the shortage of supply and consequent high prices. *Benzoin*.—Both Siam and Sumatra are in very short supply. Every parcel which arrives realizes extravagant prices. *Buchu*.—Stocks on this side are kept low by small shipments from the Cape. The prices realized are exorbitant. Freight difficulties are put forward as the cause of the small shipments. *Areca Nuts*.—Very scarce and dear on this side. There are believed to be plentiful stocks on the other side, but permission to ship has been refused. *Cinchona*.—Owing to the small shipments prices here have gradually advanced. *Gentian*.—The pre-war supplies were chiefly of Austrian origin. Spanish and French roots are now available, but at very high prices. *Hyoscyamus*.—English henbane has always been nearly sufficient for all our requirements. Egyptian henbane (*Hyoscyamus muticus*) in pressed bales has been reaching this country in fair supply for the manufacture of atropine, which is now produced here in increased quantities. *Honey*.—The freight question bears strongly on this line, but cannot be held entirely responsible for the extremely high prices now ruling, which are largely due to the keen competition from the packers and Italian warehousemen, in consequence of which wholesale druggists have difficulty in securing stocks for pharmaceutical manufacturing. *Jalap*.—There is a shortage of this drug. The occasional parcels of Mexican tubers which reach this market serve for the manufacture of jalapin. The price has quadrupled during the war. *Manna*.—Parcels of the new crop have arrived safely; freight and charges add about 2s. per lb. to the cost here. *Myrrh*.—A Persian Gulf article, and very scarce. Ordinary Aden "sorts" now fetch £12 10s. per cwt., as against 70s. pre-war value. *Sarsaparilla*.—Consignments of the different varieties of this drug arrive spasmodically. Owing to its bulky nature, shipping space can seldom be secured. All kinds command within a few pence the same price. *Senna (leaves and pods)*.—Alexandrian: An acute shortage of both leaves and pods existed for some time owing to the difficulty in securing freight, and extreme prices ruled in consequence. The position has since improved somewhat. *Tinnevely*: There are



considerable stocks in this country, but the quality leaves much to be desired. Any really good parcel which reaches the market is keenly competed for, and extravagant prices are realized. *Turmeric*.—The markets are bare of all grades, and nothing appears to be coming forward; high prices rule in consequence.

The following drugs from enemy countries are quite unobtainable: *Austria*, storax, hellebore, \*stramonium, uva ursi; *Germany*, actaea racemosa; *Turkey*, scammony, Tky. opium, Tky. tragacanth; *Bulgaria*, otto of rose.

In addition to the foregoing, the drugs which have gone out of use, or nearly so, are at present surprisingly few; the chief are glycerin, lard, and castor oil.

Some substances enjoy restricted use as compared with pre-war days on account of high prices or scarcity of supplies, as, for instance, potassium permanganate, which used to be a common domestic disinfectant.

Glycerin, as you well know, has practically disappeared from pharmacy. My reason for referring to it to-day is to record the opinion that our experience of having to do without it has been such as to manifest its usefulness in pharmacy. Not unmindful of the article by Dr. Helen P. Goodrich, we, as practical pharmacists, have good reason to deplore the want of glycerin as a real loss. Glycerin is essential for the preparation of glyceryl compounds, such as glycerophosphates and glyceryl borate (glycerin, acid, boric, and boroglycerin). Its various properties possessed by no other known substance render it a necessary ingredient in a large number of pharmaceutical preparations. Among its chief uses in this direction may be mentioned the following: 1. As a basis for glycerin suppositories. 2. As a basis for many pessaries and bougies. In this connection mention may be made of glycerin preparations (e.g. glycerin, ichthamolis) in tampons. 3. To prevent hardening, as in the gelatin base for capsules and in Unna's dressing. 4. To prevent drying, as in Cataplasma Kaolini and in Lotio Calaminac. 5. To increase viscosity, and so prevent separation, as in Glycerin. Bismuth. Carb., and in emulsion of iodoform. 6. As a solvent. The solvent uses of glycerin in pharmacy are many; as an extractive solvent in such preparations as Ext. Cinchonae Liq., Ext. Krameriae Liq.; as a plain solvent for substances which are not sufficiently soluble in other solvents, e.g. Glycerin. Acid. Carbolic., Glycerin. Aluminis, Glycerin. Hydrarg. Perchlor.,

\* Limited quantity of English to be had.

and Glycerin. Plumbi Subacet. The solvent properties of glycerin and alcohol together in many cases are superior to those of either solvent alone. Glycerin acts both as a solvent and preservative in the so-called glycerinated tinctures, and in such preparations as Glycerin. Pepsin., Glycerin. Papain., and Glycerin. Pancreatini. There is no true substitute for glycerin as a demulcent, nor is there anything to replace it for its physical effect on mucous and skin surfaces. Its extreme usefulness in throat affections approximates to the essential.

Consideration of the national food supply has resulted in pharmacy being deprived of edible fats and oils, most of these being required for the manufacture of margarine. Lard has practically disappeared from pharmacy, and one must assume for the period of the war, the whole supply being taken by the Government for food purposes. It is interesting to compare the official uses of lard in the B.P. 1914 (as published), with those of the B.P. 1867, compiled when medicinal paraffins had not been introduced. In the 1867 volume we find thirty-four ointments, of which twenty-eight were directed to be made with a lard basis, and six with wax and oils. In the 1914 edition there were forty-three ointments; the formulae of twenty-five of these have lard as a basis, while the remaining eighteen are chiefly paraffin-base ointments. Olive oil, so far as regards the higher grades, as used for edible purposes, is no longer an article of commerce in pharmacy, but the ordinary grades are available for pharmaceutical manufacturing, though supplies have to be supplemented by other oils, notably sesame or gingelly seed oil. Olive oil soaps seem to be no longer imported, so that Sapo Dur., B.P., is unobtainable; and while supplies of B.P. soft soap have not failed altogether, commercial soft soap, as used for general domestic purposes, is made from fish oils, which fact explains why occasionally everything in the home smells and tastes "fishy." Linseed oil is still available. The position of castor oil is that none is available for medicinal purposes except the product known as "neutralized seconds." Which of us, ten years ago, would have believed that such an important and every-day drug as medicinal castor oil would have become in our time unobtainable? In place of the foregoing glycerides there are available for the manufacture of the ointments, liniments, plasters, and other preparations affected, lanolin—now a British product—and hard, soft, and liquid paraffins. Modified ointments made with lanolin and paraffin bases have been in use in pharmacy already for at least six

months, and such modifications were regularized in respect of official preparations by the action of the G.M.C. in publishing on March 29 an "Alteration and Amendment" and "Schedule" to the British Pharmacopoeia.

With the view to standardizing such modified preparations, the British Medical Association representing medical interests consulted with the Pharmaceutical Society, who had already been considering the matter through its Codex Committee. The Pharmaceutical Society called in representatives, in a consultative capacity, of the Drug Club, who in turn had been considering the matter with Government departments from the point of view of supplies of materials. In fact, in the preparation of this pie no fewer than the following seven bodies have each had a finger, having been represented either directly or indirectly: General Medical Council, British Medical Association, Royal College of Physicians, Pharmaceutical Society, Drug Club, National Health Insurance Commission, and Ministry of Food. Although the conference referred to took place and agreement was reached several months ago, no publication has materialized. It is hoped that the Government will provide sufficient supplies of high grade soft paraffin suitable for pharmaceutical use, so that the supply of ointments in accordance with the agreed modified formulae may proceed satisfactorily.

On the subject of substitutes, it may be remarked that when an article which enters into a number of preparations is withdrawn by reason of the national needs in another direction being more urgent, the difficulty is not so much to find a substitute as to find one which is in sufficient and continuous supply. Not infrequently it happens that the new and unexpected demand upon the substitute promptly leads to a shortage, so that one has to keep changing from one substitute to another. In the case of the oils, such as olive oil, sesame oil, nut oil, and cotton-seed oil, these for some purposes are practically interchangeable, but for the most part substitutes are not interchangeable.

With a view to economizing sugar, where it is used merely for sweetening purposes, Government saccharin tablets have been introduced, as to which I shall doubtless be expected to say a word. You will probably not disagree with me if I refer to it as the saccharin scramble. The substance saccharin had recently caused, relatively to its importance, a record amount of annoyance to both wholesale and retail pharmacists, through the operation of the principle well known in political economy

in other directions of everyone wanting to buy the same thing at the same time. The article being Government controlled, there is no safety valve such as would be provided by the law of supply and demand in the form of an increased price. The result instead of inflated prices has been considerable irritation. In connection with the argument, which, you may remember, I advanced, that sugar does not lose its food value by reason of its incorporation into a medicinal preparation, it is interesting to record the reply given by the French Government to the British Government in answer to an inquiry as to the reasons which had led to the ban on saccharin in foodstuffs in France. This was to the effect that where sugar enters into an article for other than mere sweetening purposes it was not considered desirable in the public interest that it should be omitted and its place taken by some less useful substitute plus the small quantity of saccharin necessary for sweetening purposes.

Since we last met there has happened an event of importance—the 1918 Budget—which claims our attention to-day by reason of the fact that the enormous addition which was made to the spirit duty was, so soon as made, remitted in favour of medicines. It is yet too early to speak from experience, but there is no reason to suppose otherwise than that the rebate will work very much as has happened during the past three years, when the surtax of 1s. 6d. per proof gallon imposed on immature spirit by the Finance Act, 1915, has been remitted in favour of spirit “used solely in the manufacture or preparation of any article recognized by the Commissioner of Customs and Excise as an article used for medical purposes.” The fact is of importance to pharmacy because of the Government recognition manifested. The fact is of importance to the Nation because, if the rebate had not been given, not only would all connected with pharmacy be prejudiced, but the national health would undoubtedly suffer. It is, therefore, not merely a financial matter; very expensive spirituous medicines are apt to lead to the use of cheaper and less efficient substitutes, to the detriment of the national health.

Leaving now the consideration of drugs from the point of view of availability, we will give such brief attention as time permits to those changes in drug usage which have come about through progress in medical and surgical practice.

Taking first a group of great importance and interest to pharmacy, the anaesthetics, I would remark how satisfactory a reflec-



tion it is that the two most important general anaesthetics, chloroform and ether, are essentially British products. I do not think that any change of outstanding importance has occurred in the use of anaesthetics during the past four years, probably the most notable development which has to be recorded is in the more extended use of nitrous oxide and oxygen. First used in America, this method of producing total anaesthesia has been taken up in this country and used with much success by H. E. G. Boyle. The method is of undoubted superiority in certain cases, but is not of universal applicability. It is employed in conjunction with injections of hyoscine, morphine tartrate, and atropine sulphate. The employment of this mixture of alkaloids appears to be on the increase for producing in child-birth the anaesthesia popularly known as "Twilight Sleep." In local anaesthetics it does not appear that any remarkable change or development has to be recorded, but it is satisfactory to note that both novocaine and eucaine (benzamine) are now manufactured in this country.

The outstanding feature in wound disinfection has undoubtedly been the amount of attention which has been successfully bestowed upon the use of chlorine and hypochlorous acid as a disinfecting agent. In examining this development we may take as a starting-point, "Liquor Sodae Chlorinatae." This solution has the disadvantage of being alkaline; in order to counteract this defect we were given a series of preparations in which the alkalinity was balanced, if not neutralized. Eupad is a mixture of equal weights of bleaching powder and powdered boric acid. It may be introduced as a dry powder into the gauze pad of a first field-dressing. Eusol is prepared either from eupad or from its ingredients by shaking up 4 oz. of eupad (or 2 oz. of each of the constituents) with 1 gallon of water, allowing to stand, and filtering. The solution contains hypochlorous acid, calcium biborate, and calcium chloride. Dakin's solution is prepared by adding boric acid to a solution of sodium hypochlorite until the latter is neutral to phenolphthalein. Carrel-Dakin solution is prepared according to a formula suggested by Daufresne, in which boric acid is omitted. A solution of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$  is poured into a mixture of  $\text{CaOCl}_2$  and water, and after thorough agitation the precipitated  $\text{CaCO}_3$  is allowed to settle and the clear liquid is decanted. The proportions of  $\text{Na}_2\text{CO}_3$ ,  $\text{NaHCO}_3$ , and  $\text{CaOCl}_2$  are so adjusted that the resulting solution is neutral. Chloramine, or Chloramine T.—A further stage in the develop-

ment was reached by the introduction of *chloramine* (para toluene sodium sulphochloramide, a toluene derivative allied to saccharin, and containing the group  $\text{NCl}$ . This substance, which was prepared by F. D. Chattaway in 1905, has a powerful germicidal action, equal, indeed, to that of sodium hypochlorite, but far less irritating, with no corrosive action, and is practically non-toxic. A 1 per cent. aqueous solution is used as an antiseptic lotion for wound irrigation. Dichloramine T. is toluene p. sulphodichloramine. A 2 per cent. solution of this is used for nasal antiseptis, and a 5 per cent. solution for wound antiseptis, the solvent being a mixture of chlorinated eucalyptol and chlorinated liquid paraffin. Halazone is an allied substance, being para sulphodichloramino-benzoic acid. Further development in antiseptis has taken place in the introduction for this purpose of certain dyes. We may first consider flavine, or acriflavine, formerly called tryptaflavine, which, inasmuch as it contains a  $\text{NCl}$  group, may be considered as forming, for our purposes, a stepping-stone from the chloramines to the dyes. Acriflavine is 3·6 diamino 10 methyl acridinium chloride, while proflavine, which possesses the property of an antiseptic action, which is enhanced by the presence of serum, is 3·6 diamino-acridine sulphate. Of the dyes proper brilliant green has up to the present received most attention. Employed as a lotion in a concentration of 1 in 1000 or 1 in 2000 in normal saline solution, it forms a non-irritant antiseptic; it acts well in the presence of serum, and stains dead tissue green.

Both flavine and brilliant green are notable for combining powerful antiseptic properties with low toxicity to healthy tissue, being comparatively harmless to phagocytosis—far less so than hypochlorite. The future will doubtless witness further and extensive developments in the surgical uses of dyes. It would lead me beyond the scope of my address to make more than passing mention of the new preparations of well-known drugs which have been employed with so much success in the treatment of wounds. I refer to the treatment of burns by a mixture of paraffins with antiseptics, known as "No. 7 paraffin"; and to the dressing of wounds with "B.I.P.P.," which is a paste composed of bismuth subnitrate and iodoform made into a paste with liquid paraffin. This preparation was introduced by Rutherford Morison. The infected wound is opened up and damaged tissues removed. The surface of the wound is dried, the cavity is filled with the paste, and then closed by suture without drainage.

The wound has frequently healed when the dressing is removed for the first time at the end of three weeks.

It will probably not be without interest to members of the Conference if I recount very briefly the procedure commonly followed up to recent years, in fact up to the war, in the treatment of venereal diseases, taking first syphilis. In accordance with the universally accepted belief that the *Spirochaeta pallida* was the cause of syphilis, and arsenic being found to kill the spirochaeta, it naturally followed that arsenic cured syphilis. Arsenic was administered in the form of an organic compound, the idea being that the "organic" arsenic would be, in the doses given, toxic to the spirochaeta and non-toxic to the human host. Of the arsenical bodies used, salvarsan, stated to be the 606th compound prepared for the purpose by Ehrlich—a statement which makes some demand upon our credulity—was used by far the most widely. Later, Ehrlich introduced neo-salvarsan. The practice was to administer salvarsan until the Wassermann reaction became negative, and then—as it is most important to bear in mind—treatment with mercury and potassium iodide was continued for one to two years afterwards. As a matter of fact, in spite of prolonged mercury treatment, recurrence, after a time, was the rule. About seven years ago it occurred to McDonagh, who had worked for some time with Ehrlich, that if the theory upon which the treatment was based was sound, salvarsan ought really to cure syphilis, which it certainly did not do. The reason for the incomplete success of the arsenical treatment McDonagh found in his theory that the *Spirochaeta pallida* is not itself the sole cause of syphilis, but is the male phase in the somewhat complicated life history of a protozoon, which he named *Leucocytozoon syphilidis*. According to McDonagh's theory, the successful treatment of syphilis lies in the administration alternately of oxidizing and reducing agents. Salvarsan and neo-salvarsan were, as is well known, German products, supplies of which to this country were completely cut off by the war. They are now manufactured in this country under the names of kharsivan and neo-kharsivan, also under the names of arsenobillon and novarsenobillon; more recently there have appeared diarsenol and neodiarsenol. Galyl, tetraoxydiphosphaminodiarsenobenzene, a French product, is said to be the safest arsenical body, and mention must not be omitted of Danysz's di-sodo-luargol, a French arsenical compound containing antimony and silver. The disadvantages of arsenical bodies are

stated to be : nervous recurrences, arsenical dermatitis, arsenical nephritis (albuminuria), arsenical jaundice, and acute yellow atrophy of the liver. With a view to obviating these toxic symptoms, McDonagh introduced the sulphur body, intramine, which is di-orthoamino thiobenzene. The sulphur atom acts as a non-toxic reducing catalyst after the amino groups have become attached to the lipoid-globulin particles of the serum. More recently still he has introduced colloidal iodine with notable success. As oxidizing agents McDonagh uses metals in a colloidal state, mercury and manganese being most successfully employed. The treatment of syphilis may be said to be in a state of flux, and in view of the enormous importance of the subject not only to medicine and pharmacy, not only to the whole nation, but to the whole world, in view, too, of the probability of important developments, the subject will be followed during the next few years with the closest attention by all interested in the scientific side of pharmacy. In the treatment of *ulcus molle* (soft sore) British bismuth subgallate and British bismuth tribromphenol replace the German proprietaries *dermatol* and *xeroform* ; chronic soft sores, and *ulcus molle serpiginosum*, a complication formerly incurable, are now cured by intramine, injected and applied locally ; while colloidal manganese is available to abort buboes, which formerly had to be incised. In the treatment of gonorrhoea both colloidal manganese and colloidal intramine have been introduced and found invaluable in complications hitherto incurable. I wish particularly to draw attention to the fact that the new remedies, with the exception of a few which are French, are all British products. The mention of colloidal metals, colloidal intramine, and colloidal iodine opens up a subject which must be of intense interest to all scientific pharmacists, but quite beyond the scope of my address, the whole subject of the mode of action of substances in the colloidal state—of the state of subdivision necessary for physiological action ; for the difference between “ solution ” and “ colloidal condition ” is, of course, only a difference in degree of subdivision, a difference of degree in the size of the particles.

The physiological testing of drugs and preparations does not appear to have made any signal advance of late, or to call for any special comment. Bacteriology, on the other hand, is growing yearly in importance, not only in diagnosis and in preventive medicine, but also in the treatment of disease. It is, I venture to think, a matter for congratulation that arrange-



ments have been made for the teaching of micro-biology at the Society's School at 17, Bloomsbury Square.

Before closing, I wish to say a few words about the production in this country of synthetic organic chemicals. That Germany has a monopoly of chemical knowledge is a ridiculous fallacy which is held now only by persons of "low intelligence and high credulity." It is now recognized that nearly all the epoch-making discoveries in chemical science, as in other sciences, have been made outside Germany. It may be said further that a goodly number of the pioneer researches have been British. Aniline dyes were discovered by an Englishman, and were first manufactured in this country. The causes which have led to the loss of this industry, to the exploitation of it by Germany, and with it the rest of the fine chemical industry, cannot be gone into within the limits of this address. Suffice it to say that this most striking example is but an illustration of what has occurred repeatedly. The discovery has been British—the industry has become German. Members of the British Pharmaceutical Conference do not need to be informed that a large number of synthetic organic chemicals have been successfully manufactured in this country during the war: the antiseptics and venereal remedies already referred to; chemicals for trench and gas warfare—offensive and defensive; dyes and intermediates: salicylic acid, aspirin, phenacetin, hexamine and saccharin are being produced regularly on a commercial scale. In fact, whenever a particular substance has been required for a particular purpose, British chemical science, plus British chemical industry, have not failed to produce it in requisite amount and of requisite purity within a reasonable time. Question of cost apart, the thing can be done. These few examples from a list which could very easily be made a long one serve to show that British chemists not only have the brains to make discoveries, but also the technical ability to produce synthetic organic bodies on the large scale. Of practically each one of these, however, one may say that its manufacture has been an industry "ad hoc." This will not suit post-war conditions. It should be remembered, however, that manufacturers have had to meet war demands—to which all "after-the-war" questions have to be made subservient—and to work under war conditions—the worst possible for creating a new industry. In the meantime these two facts of primary importance do seem at length to have been realized: first, that one cannot expect to build up in a short time and under war conditions an industry which it has taken Germany's re-

sources two generations to develop. Secondly, that this industry is dependent on the dye industry. In the latter industry there are necessarily produced in large quantities a number of chemicals known in the trade as "intermediates." These "intermediates" are starting points or stepping stones in the manufacture of synthetic drugs. The fine chemical industry must go hand in hand with the dye industry, and be worked systematically and on a large scale if it is to be made a national industry which can overtake the enormous start that Germany has. If the fine chemical industry is to be developed in this country on a scale anything like commensurate with its importance (and it must be borne in mind that it is a key industry, and therefore of paramount importance to the general development of national industry), Government assistance at the conclusion of hostilities will for a time be absolutely essential. A further necessity is a supply of trained men. Professor Pope, in his recent presidential address to the Chemical Society, referred to the shortage of young trained chemists which would be our difficulty after the war. We have also to produce chemical technologists. Every encouragement should be given to our most promising University graduates to continue their training and convert themselves into thorough technologists, with a view to entering chemical industry, and every appreciation and support should be given to those who are making efforts in this direction. In this connection the scheme now being initiated by the Salters' Company—one of the leading and most ancient of our City Guilds—is especially noteworthy. In pharmacy we require pharmaceutical technologists—a class very rare in this country. Should not something be done in the way of post-graduate training, on terms to attract the best men, for the production of first-rate pharmaceutical technologists? They will be required in the future if British pharmacy is to be in the forefront. We members of the British Pharmaceutical Conference, as representing the scientific side of pharmacy, are concerned with such post-war problems, concerned, indeed, with all that is involved in that comprehensive term "reconstruction."

The future position of pharmacy, I submit, gives food for careful thought.

In my address to you a year ago I urged that machinery should be set up by which pharmacy should be able to speak with one voice to any Government department, to Parliament, to the public, and suggested that the Pharmaceutical Society should

set up a Public Policy Council on which every side of pharmacy should receive representation proportionate to the merits and magnitude of the interests concerned. Professor Pope, in his admirable address to the Chemical Society, to which I have already had occasion to refer, makes a very similar proposal on behalf of chemistry. He advocates that the various bodies representing their respective sections of chemical activity "should set up a watchful and alert joint Council, with directions to consider national questions in which any of the varied interests of chemistry are concerned, and to make such representations to our administrators as would voice the corporate view of the joint body." This important suggestion has not fallen upon deaf ears, for steps are already being taken with a view to carrying it into effect.

When we reflect upon the many problems which will confront pharmacy after the war, both internal and external to this country and this Empire, does it not seem desirable that those whose livelihood is bound up with pharmacy should join hands for their common good? The Council of the Pharmaceutical Society does, on occasion, call in representatives of the manufacturers in a consultative capacity, but this does not meet the case. It seems impossible sometimes to get a thing done without repeated exhortation; at the risk of being irksome, I must repeat my plaint that the main interests of the two sections into which pharmacy is divided, retail and wholesale, are essentially common interests, and that both sections will benefit by fighting, not each other, but their common adversaries. The future of pharmacy, I believe, is dependent to a not inconsiderable extent on the realization of this principle; not only now, but after peace has come—and may that be not far distant!

#### VOTE OF THANKS TO THE PRESIDENT

Mr. F. RANSOM, in moving a vote of thanks, remarked that the President's address was eminently useful and practical. Although civil needs must to a certain extent be disregarded under present war conditions, the President had shown that certain commodities were essential in order to keep the Army and the civil population in health, and in that connection there were points which seemed rather to have been neglected and overlooked by those in authority. Perhaps the most important of these was glycerin. It was now impossible to obtain supplies of this article, yet, as the President had shown, it was one of

the most essential of drugs. The movement for a coalition of pharmaceutical interests referred to by the President should be useful in promoting the protection and development of pharmacy after the war.

Mr. T. H. W. IDRIS, in seconding the vote of thanks, described the address as one of great interest and importance to every pharmacist. The knowledge and recommendations which it contained were of the greatest value.

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#### THE EXECUTIVE COMMITTEE'S REPORT

Mr. R. R. BENNETT read the following report :—

In presenting this the fifty-fifth Annual Report, the Executive wish once more to express the thanks that are due to the pharmacists of Liverpool for having provisionally invited the members of the Conference to meet in Liverpool, and the Executive venture to hope that in the not very distant future conditions will be such that it will be possible to enjoy the hospitality which has been so kindly offered.

In the existing circumstances it has been inevitable to follow the precedent of the last three years, and to confine the scope of the Annual Meeting to the delivery of the Presidential Address, and the general business of the Conference. Two scientific papers have been contributed to the present meeting. These will be taken as read, and afterwards published in full in the *Year-Book of Pharmacy*.

One of the most pleasing features in the affairs of the Conference during the past year has been the gift of Consols to the nominal value of £1,250 to the funds of the Conference, to be held in trust and the Executive to have full discretion to use the interest in any way they may consider to be for the benefit of pharmacy. The donor of this munificent gift, who is an "1864" member, desires to remain anonymous.

The losses by death have been heavy, and the list includes Mr. Thomas Tyrer (Stratford), President of the Conference in 1907; Sir Edward Evans (Liverpool), President of the Conference in 1912; Mr. G. S. Woolley (Manchester), Vice-President of the Conference in 1887 and in 1907; Professor J. P. Remington (Philadelphia), an Honorary Member; Mr. J. Baxter (Ballymoney); Mr. J. E. Brunner (Dublin); Mr. T. Dobinson (Bishop Auckland); Mr. W. R. Dodd (Cheshunt); Mr. J. J. Evans (Liverpool); Mr. F. H. Lescher (London); Mr. W. Inman



(Edinburgh); Capt. W. V. Johnston (Dublin), died on active service; Mr. J. Kirkpatrick (London); Lt.-Col. Clifford Probyn (London); Mr. W. E. Row (Sydney); Mr. W. T. Upfill (Walworth).

During the past year the Executive has held four meetings, but the activities of the Research Sub-Committee, and the Practice Section of the Conference, and the Conference Development Sub-Committee have been suspended.

Every effort is being made to maintain the standard of the *Year-Book of Pharmacy*, and in this connection the Executive desire again to put on record their appreciation of the services of the Editor, Mr. J. O. Braithwaite, and the Compiler of the New Remedies Section, Mr. T. Stephenson.

In conclusion, the Executive desire to thank the Council of the Pharmaceutical Society for making provision for the meetings of the Executive during the past year, and also for providing accommodation for the present Annual Meeting.

Mr. H. WIPPELL GADD proposed that the report be adopted. He said that members owed a debt of gratitude to the Executive for preserving the continuity of the Conference. The report was a brief one, but it was a remarkable one in some respects, and members might congratulate themselves upon the substantial endowment which placed funds at the disposal of the Committee for the furtherance of pharmacy.

Mr. F. W. CROSSLEY-HOLLAND seconded the resolution for the adoption of the report, which was agreed to unanimously.

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#### THE HON. TREASURER'S REPORT

Mr. D. LLOYD HOWARD, in submitting his report, remarked that a gratifying feature in the accounts of 1917 was that the income had slightly increased on subscriptions, sale of *Year-Books* and advertisements. This, he thought, was very satisfactory, showing that even under present conditions interest in the Conference is well maintained. On the other hand, owing to the greater cost of everything in connection with the printing and publishing trade, the expenditure had again exceeded the income by nearly £40, but there was still a balance of £44 0s. 3d.

The receipts to date were £250 in subscriptions, as against £240 at the same period last year. There had been no grant from the Bell and Hills' Fund in 1917, and the balance was

therefore increased by the amount of the income, £6 15s., and stood at £43 10s. 9d. He regretted again to have to report that no grants from the Research Fund had been made during the year, and the Fund therefore remained at the previous figure of £18 12s. He was glad to say that the hint which he had given at the last Annual Meeting that the subscription was not limited to 7s. 6d. had been acted upon by an increased number of members.

Mr. A. R. MELHUISE, in moving the adoption of the report, said that the Conference undoubtedly supplied a vital need in pharmacy. He expressed the hope that in future years the Treasurer would have more money to spend, and that they would find men who were prepared to come forward not only with scientific but also with business papers. If they could combine these two features there would be a brighter future for pharmacy in all respects.

Mr. H. SKINNER seconded the motion, which was put to the meeting and carried unanimously.

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#### ELECTION OF OFFICERS FOR 1918-1919

On the motion of Mr. W. A. H. Naylor, which was seconded by Mr. H. Humphreys Jones and supported by Mr. W. H. Saunders, the following officers were elected :—

*President*, Mr. W. Kirkby; *Vice-Presidents*, Messrs. W. L. Currie, W. P. Evans, Lt.-Col. E. F. Harrison, Messrs. J. Michie, Edmund White, G. Whitfield; *Hon. Treasurer*, Mr. D. Lloyd Howard; *Hon. General Secretaries*, Capt. H. Finnemore, Mr. R. R. Bennett; *Hon. Local Secretary*, Mr. H. Humphreys Jones; *Other Members of the Executive Committee*, Messrs. F. W. Crossley-Holland, H. Deane, F. W. Gamble, C. H. Hampshire, A. R. Melhuish, H. Skinner, Professor H. L. Smith, Messrs. T. Stephenson, H. Wyatt. *Hon. Auditors*, Messrs. W. F. Gulliver, W. L. Howie.

Mr. W. A. H. NAYLOR said that all would regret deeply that the retiring President had not had an opportunity of visiting the provinces. It would have been a great pleasure to him, and it could not but be a great loss to their friends in Liverpool, but he trusted that the loss would be retrieved. Mr. William Kirkby, who was proposed as the new President, needed no words of commendation. The University of Mr. Kirkby's own City of Manchester had shown its appreciation of his work

by conferring upon him the degree of M.Sc., and the Conference desired to show their high esteem by electing him to the highest office it was possible to bestow.

Mr. H. HUMPHREYS JONES, in seconding the motion, spoke in eulogistic terms of the character and work of the President-designate. He then renewed the invitation that the Conference should meet in Liverpool when peace had been restored.

Mr. W. H. SAUNDERS recalled the successful meeting of the Conference in Liverpool in 1896 and assured the members that they would be sure of a rousing Lancashire welcome when they visited Liverpool again.

Mr. W. KIRKBY thanked the members of the Conference for having invited him to become their President. He did not regard the honour as being entirely a personal one, but rather as one which was intended as a recognition of the City of Manchester to which he belonged, and which for a great number of years had been keenly interested in the Conference.

#### THANKS TO THE RETIRING PRESIDENT

Mr. P. F. ROWSELL said it was with much pleasure he moved that the best thanks of the meeting be given to the retiring President, Mr. C. A. Hill. Those who had listened to the Presidential Address at that meeting were witnesses to Mr. Hill's ability to put his finger on the very spots that needed attention. The Conference was indeed fortunate in having commanded Mr. Hill's services as President, and he had amply justified their choice in appointing him to that responsible position.

Mr. A. H. JENKIN, in seconding the motion, was glad to note from Mr. Hill's remarks that he was a man of ideals as well as of action. Some of these ideals were on the way to fulfilment, and he hoped that others would be attained in the fullness of time.

The motion was put to the meeting and carried with enthusiasm.

The PRESIDENT responded briefly to the vote of thanks, and then announced that arrangements had been made for the members to lunch in the Gordon Room at the Holborn Restaurant.

## PAPERS COMMUNICATED TO THE SCIENCE SECTION

## THE EVALUATION OF BALSAM OF TOLU.

By T. TUSTING COCKING AND JAMES D. KETTLE, B.Sc., F.I.C.

It has been pointed out by several observers that the method of the British Pharmacopœia, 1914, for the estimation of the balsamic acids in balsam of tolu is unsatisfactory. The results obtained are low, as much of the aromatic acid present is combined with resin alcohols and is insoluble in, and thus not extracted by carbon disulphide.

In 1914 we described a process for the evaluation of benzoin, by which the balsamic acids could be separated from the resinous matter, and the free and combined benzoic and cinnamic acids determined.\*

The original experiments leading up to this process were carried out on balsam of tolu, and the method was afterwards applied to both benzoin and storax, the results of the former being published.\*

The method (now official in the British Pharmacopœia, 1914) adopted for the estimation of the aromatic acids in the case of storax † was tried on balsam of tolu, but abandoned, as repeated extractions by boiling with water caused the resinous matrix to become so stiff and intractable that it was impossible to extract the acids completely.

Boiling out of the aromatic acids with magnesium oxide and water, in the presence of a small quantity of xylene to soften the resinous matter, was found to be the most satisfactory way of dealing with the balsam. The magnesium salts of the aromatic acids are readily soluble in cold water, those of the resin acids being insoluble. A complete separation is effected and the aromatic acids are obtained in a purer condition than by aqueous extraction alone.

The mode of procedure is as follows:—

(1) FREE BALSAMIC ACIDS.—Five grams of the balsam are dissolved in 25 c.c. of hot alcohol in a 250 c.c. CO<sub>2</sub> flask, 5 grams of

\* *Y.B.P.*, 1914, 355.

† *C. & D.*, March 16, 1912, and May 25, 1912.



light magnesium oxide and 20 c.c. of xylene are added, and the flask shaken round until the contents are well mixed. 100 c.c. of water are now added, the flask connected to a reflux condenser and boiled for 1 hour. After cooling, the whole is poured on a Buchner filter, and the aqueous portion of the filtrate separated from the xylene layer, which is returned to the flask together with the filter paper and adhering magnesia-balsam magma. A second 100 c.c. of water is added, and the flask again boiled for an hour, when the aqueous portion is separated as before and the extraction carried out a third time. The bulked aqueous liquids are washed once with 20 c.c. of ether, then rendered acid with hydrochloric acid, and the precipitated acids extracted by shaking out with ether. The greater part of the ether is distilled off, and the residual aromatic acids dried in vacuo over sulphuric acid and weighed.

(2) TOTAL BALSAMIC ACIDS.—2.5 grams of the balsam are saponified by boiling with excess of alcoholic potash: most of the alcohol is then evaporated off, the residue dissolved in 100 c.c. of hot water, and sufficient hydrochloric acid added to render the whole slightly acid. Five grams of light magnesium oxide and 20 c.c. of xylene are next added, and the whole boiled up under a reflux condenser for 1 hour. The aqueous liquid is separated, the extraction twice repeated, and the bulked aqueous liquids treated as in the case of the free balsamic acids.

The proportion of cinnamic acid is determined by the gain in weight on bromination, details of which may be found in our previous note.\*

The aromatic acids obtained from balsam of tolu are not quite so pure as those from benzoin and storax. The brominated acids from the two latter are white and pleasant smelling, while those from tolu are slightly brown in colour, and contain a substance which is extremely pungent and lachrymatory.

Balsam of tolu, as a rule, contains very little that is not soluble in alcohol, but occasionally samples are met with containing woody matter. Three such samples contained 1.6, 8.9, and 9.0 per cent. of insoluble matter.

Moisture, generally present, was estimated by spreading in a thin layer on a sheet of glass and drying in vacuo over sulphuric acid. Amounts varying from 2.0 to 8.6 per cent. were found, and the dried balsam was usually quite brittle.

The determination of the acid value of the balsam is somewhat

\* *Y.B.P.*, 1914, 355.

difficult owing to the dark colour, and to the precipitate which is formed on running in the alcoholic potash. We find it best to proceed as follows:—

Dissolve 5 grams of the balsam in about 50 c.c. of boiling alcohol, add a large quantity of phenolphthalein solution—3 or 4 c.c.—titrate the hot solution with normal alcoholic potash until the colour becomes dark brown (but not red), then attach to a reflux condenser, boil up for a few minutes in order to break up the precipitate, and finish the titration.

By this method titrations agree to about 0.2 c.c. N/1 KOH.

We append a table of analytical data selected to show the variations from a large number of samples of balsam examined during the last few years.

Excluding numbers 11 and 12, which, from their low content of balsamic acids, we believe to have been sophisticated, the figures indicate a range of—

92.2 to 132.4 for acid value

59.3 to 90.9 for ester value

154.8 to 208.7 for saponification value

and 32.68 per cent. to 47.50 per cent. of total balsamic acids.

The pharmacopœial limits for acid value are from 107.4 to 147.2, and for saponification value 170 to 202.

Judged by these figures, numbers 3, 4, 6, 7, 8, and 9 would be rejected for low acid values: also the saponification values of numbers 6, 7, 8, 9, and 13 lie outside the limits, although the poorest of these balsams contains 33.87 per cent. of balsamic acids. On the other hand numbers 11 and 12, though abnormally low in balsamic acids, would be admitted as genuine.

We suggest that the pharmacopœial limits be revised, that an improved method for the determination of the balsamic acids be inserted, and also that limits for ester value be adopted in place of those for saponification value. The differences between the extreme limits for acid value and those for saponification value do not coincide with the limits of the ester value.

The experimental work entailed by the above has been carried out in the laboratories of The British Drug Houses, Limited, under the direction of Mr. C. A. Hill, to whom we are indebted for permission to publish the results.

No.	Acid Value.	Ester Value.	Saponification Value.	Per cent. Free Benzoic Acid.	Per cent. Free Cinnamic Acid.	Per cent. Combined Benzoic Acid.	Per cent. Combined Cinnamic Acid.	Per cent. Total Balsamic Acids
1	111.8	71.2	183	8.55	11.99	6.19	5.93	32.66
2	112.3	79.0	191.3	9.12	11.53	7.87	6.56	35.08
3	98.1	79.1	177.2	8.48	11.86	8.35	8.68	37.37
4	100.6	72.2	172.8	7.8	10.69	7.45	8.92	34.86
5	118.2	60.8	179	9.1	13.7	5.94	8.97	37.71
6	92.2	62.6	154.8	6.63	12.4	6.17	8.67	33.87
7	101.3	65.9	167.2	8.29	13.71	5.37	10.13	37.5
8	102.5	59.3	163.8	8.34	13.54	5.22	9.08	36.18
9	96.6	65.0	161.6	7.86	13.12	6.43	9.95	37.36
10	132.4	66.2	198.6	7.42	15.9	11.1	5.2	39.86
11	140.1	39.4	179.5	—	—	—	—	24.74
12	124.3	58.3	182.6	—	—	—	—	24.4
13	117.8	90.9	208.7	—	—	—	—	47.56
14	108.9	85.3	194.2	—	—	—	—	45.12

## A NOTE ON THE DECOMPOSITION OF SOLUTIONS OF HYDROCYANIC ACID

By W. LEWCOCK, B.Sc.

The characteristic decomposition which hydrocyanic acid undergoes whereby a dark brown precipitate is formed, was noted during the course of experiments on the production of the anhydrous gas on the large scale. One product of the decomposition is stated in the literature to be amino-malono-nitrile  $\text{NH}_2\text{CH}(\text{CN})_2$ —the reaction, however, is complex, and in this note attention is paid solely to the cause of the decomposition, on which light is hardly likely to be thrown by an enumeration of the various products of the decomposition.

As is known, on mixing a solution of sodium cyanide with a mineral acid, a yellow colour appears as soon as any local excess of cyanide occurs, and if this excess is permanent, the decomposition proceeds with the separation of brown flocks. The reaction is so rapid at higher temperatures that in attempting to run a continuous flow plant, in which the gas was rapidly driven off by steam heating, it was essential always to keep the mixture acid, otherwise the outflow pipe soon became blocked

with the deposit. The decomposition, which is due solely to excess of sodium cyanide, is thus prevented by having excess of acid present, but too much mineral acid effects the normal hydrolysis to ammonium formate, and it may be noted that on trying to dry the gas with pure sulphuric acid (96 per cent.) at 40° C., it is completely decomposed to ammonia and carbon monoxide. On running strong cyanide solution into leaden tanks, the liquid soon became filled with a brown precipitate; this at first appeared due to the polymerization in question, but proved to be the result of interaction of a trace of sulphide in the cyanide with a film of lead oxide.

It is interesting to note that whereas sodium carbonate dissolved in 30 per cent. sodium cyanide solution causes in time the separation of a slight brown precipitate, caustic soda has not the same effect. Presumably it is the hydrocyanic acid formed by hydrolysis which is thus decomposed; caustic soda represses the hydrolysis.

In order to investigate the influence of different compounds on hydrocyanic acid, solutions of the latter (7-8 per cent.) in water were made by running 30 per cent. cyanide solution into sulphuric acid (50-60 per cent.) which was slowly warmed up on a water bath, the gas evolved being condensed and collected in distilled water. The solution was then mixed with various reagents, and kept in sealed tubes in a dark cupboard. It was found that weak acids and salts of acid reaction had no influence in promoting the decomposition of the hydrocyanic acid; but the addition of bases such as caustic soda, potash and ammonia resulted in the formation of soluble cyanides which brought about the reaction. Further it was found that a large number of salts also caused the decomposition to proceed at varying rates. These include the soluble carbonates and bicarbonates, the alkali salts of nitrous acid, normal sodium phosphate, sodium sulphide, sodium sulphite, sodium ferrocyanide and sodium acetate. Sodium sulphocyanide differs from sodium cyanide in that it does not affect the acid. Thus salts of alkaline reaction are reactive, in all cases probably through the formation of a small quantity of cyanide, and this explains the variation in activity which such salts show. Borax, which is very active, is derived from an acid which is practically as weak as hydrocyanic acid itself.

Three quantitative experiments on the decomposition of 3.6 per cent. solutions of the acid at ordinary temperatures



were carried out, and it was found that when the solution contained 1 per cent. of sodium cyanide, in two weeks 47.4 per cent. of the acid was decomposed; when it contained 0.75 per cent.  $\text{NaHCO}_3$ , in five weeks 1.4 per cent. was decomposed; and when it contained 1.4 per cent.  $\text{NaNO}_2$ , 8.8 per cent. was decomposed in two weeks. In the last case it was found that decomposition had been hastened by the presence of a trace of alkali in the nitrite used. It was noted in these experiments that addition of hydrogen peroxide to the hydrocyanic acid oxidizes it to cyanic acid, which on standing precipitates the white insoluble cyamelide.

Potential causes of the decomposition of the acid "spontaneously" on keeping are the action of light and air, the action of impurities contained in the water, the action of substances derived from the cork or rubber, the action of the materials used in preparation of the acid, and finally the action of substances derived from the glass vessel in which the acid is kept. In the case of solutions of strength varying from 2%-7%, it has not been noted that air or diffused light can effect decomposition appreciably, but a 4% solution exposed directly to strong light began to decompose after 3 months although a similar solution was unchanged in the dark during that time. Of course, if the solution be exposed freely to the air it rapidly loses strength owing to the volatility of the hydrocyanic acid. In view of the above results on the influence of bicarbonates on the acid it is evidently best to avoid the use of tap water; although unless this is very hard the acid will only be affected very slowly, as experiments have proved. Neither cork nor rubber affects the stability of the acid, although both are able to absorb considerable quantities of it—thus it was noted that a rubber cork retained the characteristic smell for a considerable time after it had been thoroughly washed. Experiment showed that a red rubber cork cut in thin slices absorbed in two days 6.5 per cent. of its weight of hydrocyanic acid from a 7 per cent. solution—cork similarly absorbed in four days 2.34 per cent. of its weight. E. R. de Ong (*J. Agric. Res.*, 1917, 11, 421-436) has pointed out the absorption of the acid in soil. So far as the influence of the materials used in preparation of the acid is concerned, this could hardly be harmful; for, whether the gas is generated from the action of strong cyanide on sulphuric acid, or it is got by distilling a dilute acidified ferrocyanide solution, the sole impurity likely is acid, which, as is

mentioned below, tends to keep the solution. Solutions were made by these two methods for comparison and showed little difference; though actually that from ferrocyanide kept the better. If the hydrocyanic acid was purified from the trace of mineral acid by redistillation the solution commenced to decompose earlier.

Finally, we have the influence of substances derived from the glass vessel in which the acid is stored, and there can be no question that this is the main, if not the sole reason why dilute solutions of the acid cannot be kept indefinitely. The solution slowly dissolves from the glass sodium silicate, which in turn forms sodium cyanide which is able to effect polymerization of the remaining acid. This change proceeds very slowly, but it was shown fairly rapidly in the following experiment. Two samples of 8 per cent. hydrocyanic acid were sealed in tubes; to one of these had been added a quantity of clean finely ground soft glass. Both samples were shaken from day to day, and after two days, the sample containing the glass was yellow, while after nine days it was dark brown, and a considerable deposit had formed. Meanwhile the other sample had remained unaltered. The same effect was shown quantitatively by diluting 4 gm. of hydrocyanic acid to which 9 gm. of ground glass had been added to 100 c.c., and keeping, the whole being well shaken occasionally. After three weeks 12.2 per cent. of the acid had decomposed.

It is stated that mineral acid is added to the commercial prussic acid (2 per cent. HCN) and to Scheele's acid as a preservative, and the reason for this is quite evident from the previous results. Samples of 2 per cent. and 4 per cent. acid were kept in 6 oz. bottles—the latter solution showed signs of decomposition after 4 months and the former after 6 months. Meanwhile similar samples to which had been added 1 per cent.  $\text{H}_2\text{SO}_4$  (calculated on the weight of HCN) remained unaltered. The time these acidified samples could be kept would of course depend on the quantity of mineral acid added, but from results obtained by the method next described it would appear that if as much as 10 per cent.  $\text{H}_2\text{SO}_4$  (calculated on weight of HCN) could be added such solutions would for practical purposes keep indefinitely. This method consisted in sealing up together the acid, a definite amount of powdered glass, and some third constituent added with a view to preserving the acid. The following results were thus obtained:—

(a)	(b)	(c)
Amount of HCN used.	Made up with 5 c.c. of	Time before appearance of yellow colour.
(1) 5 c.c. 8 per cent. acid.	Distilled water.	2 days.
(2) " " "	Absolute alcohol.	2 days.
(3) " " "	Dilute $\text{H}_2\text{SO}_4$ (1 per cent. on HCN).	23 days.
(4) " " "	Tartaric acid solution (acid equivalent half that of the $\text{H}_2\text{SO}_4$ in Experiment 3.	12 days.
(5) " " "	Water saturated with $\text{CO}_2$ .	13 days.
(6) " " "	Tartaric acid solution 0.04 gm. in 5 c.c.	Unaffected after 4 months.
(7) 5 c.c. 4 per cent. acid.	50 per cent. glycerin.	2 weeks.
(8) " " "	Distilled water	2 weeks.
(9) " " "	20 per cent. solution of mannitol.	13 days.

In each case 0.5 gm. of ground glass was added, and the sample shaken from day to day.

It appears from results (5) and (2) that carbon dioxide has considerable preservative influence on the acid, while absolute alcohol has none. It has been stated by Williamson that prussic acid containing 20 per cent. of glycerin keeps indefinitely; but no glycerin being available at the time, it was thought possible that such a compound as tartaric acid might prove useful, as it is both acidic and of similar structure to glycerin. It is evident, however, that the preservative influence of tartaric acid depends entirely on its acidity (3) and (4). Later, when some glycerin was obtained, it was possible to test the statement of Williamson, which, if true, would indicate the possible formation of a compound, just as boric acid forms compounds with glycerin and mannitol; but whereas the addition of glycerin increases the acidity of boric acid, such is not the case with hydrocyanic acid; and experiments (7), (8), (9) above show finally that neither glycerin nor mannitol has any influence in preserving the acid.

The only alternatives to the use of some such acid preservative as is suggested above would appear to be the use of some vessel from which water does not dissolve alkali, or the use of a glass vessel coated inside with some suitable neutral material.





# BRITISH PHARMACEUTICAL

## RECEIPTS AND EXPENDITURE FOR

1917.		£	s.	d.	£	s.	d.
Jan. 1.	To Balance from last year . . . . .				83	10	1
Dec. 31.	„ Members' Subscriptions received by Hon. Secretaries . . . . .	297	12	0			
	„ „ „ paid to Bankers . . . . .	18	9	0			
					316	1	0
	„ Sale of <i>Year-Book</i> by Publishers . . . . .	18	3	5			
	„ „ „ „ Hon. Secretaries . . . . .	14	12	0			
					32	15	5
	„ Advertisements in <i>Year-Book</i> . . . . .				74	12	0
	„ Bank Interest on Deposit . . . . .				8	0	0
					£514	18	6

### LIABILITIES.

Butler & Tanner . . . . .	244	14	6			
Bell & Hills' Fund . . . . .	43	10	9			
T. Stephenson . . . . .	10	0	0			
				298	5	3
Balance . . . . .				44	0	3
				£342	5	6

### BELL AND HILLS' FUND.

1917.		£	s.	d.	£	s.	d.
Jan. 1.	To Balance in Hand . . . . .	33	15	9			
	„ Dividend on Consols . . . . .	6	15	0			
					£43	10	9

### ASSETS :—

£360 Consolidated 2½% Stock and above Balance.

# ICAL CONFERENCE,

YEAR ENDED 31st DECEMBER, 1917.

1917.		£	s.	d.	£	s.	d.
Dec. 31.	By EXPENSES OF YEAR-BOOK (1917):—						
	Printing, Publishing and Binding	237	15	8			
	Posting and Distributing per						
	Butler & Tanner	16	0	10			
	„ „ per Hon. Secretaries	2	0	0			
	Reprints, etc. . . . .	3	15	3			
	T. Stephenson . . . . .	10	0	0			
					269	11	9
	„ Carriage, Packing etc. (per Secretaries)	2	10	0			
	„ Secretarial Work re Advertisements	10	0	0			
	„ Advertisements in Lists and Post- age (J. & A. Churchill) . . .	2	7	4			
					14	17	4
	„ Editor's Salary and Honorarium .				100	0	0
	„ Secretarial Expenses . . . . .				35	0	0
	„ Postage, etc. (Secretaries) £12 5s.; (Editor) 15s. 11d. . . . .	13	0	11			
	„ Petty Cash Sundries . . . . .	5	3	7			
					18	4	6
	„ PRINTING, STATIONERY, ETC.:—						
	„ Ash & Co. . . . .				27	19	0
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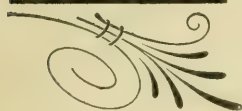
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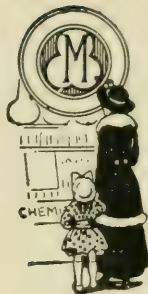
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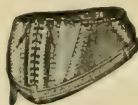
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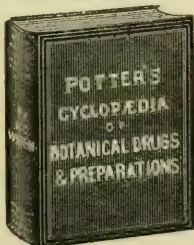
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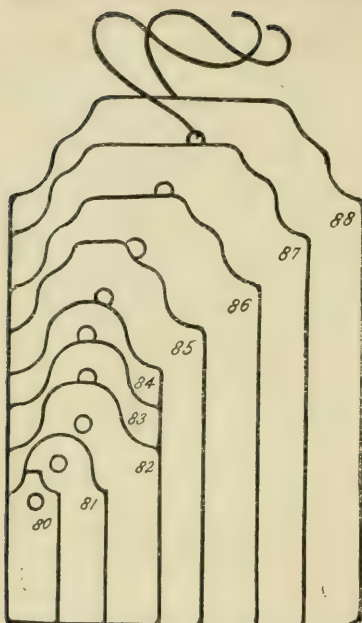
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